Graphics **Interface** 2013

Regina, Saskatchewan, Canada
29 - 31 May 2013

Proceedings

Edited by
Faramarz F. Samavati
Kirstie Hawkey

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ISSN: 0713-5424
ISBN: 978-1-4822-1680-6

Proceedings Graphics Interface 2013, Faramarz F. Samavati and Kirstie Hawkey (Program Chairs), Regina, Saskatchewan, Canada, 29 - 31 May 2013. Published by the Canadian Human-Computer Communications Society / Société canadienne du dialogue humain-machine and CRC Press.

Graphics Interface is sponsored by:
The Canadian Human-Computer Communications Society / Société canadienne du dialogue humain-machine (CHCCS/SCDHM)

Membership Information for CHCCS/SCDHM is available from:
Canadian Information Processing Society (CIPS)
5090 Explorer Drive, Suite 801
Mississauga, Ontario L4W 4T9
Canada
Telephone: (905) 602-1370
Fax: (905) 602-7884
Web: http://www.cips.ca/

Additional copies of the proceedings are available from:
CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742
CRC Press is an imprint of Taylor & Francis Group, an Informa business

Published by the Canadian Human-Computer Communications Society / Société canadienne du dialogue humain-machine and CRC Press
Distributed by CRC Press
Available online through the Association for Computing Machinery (ACM) Digital Library.
Editorial and production support by Meghan Haley at Junction Publishing.
Printed in the USA by The Printing House Inc.

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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 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 longest-running regularly scheduled conference in interactive computer graphics. Most years it is co-located and coorganized with several other conferences: this year the AI/CRV/GI 2013 conference, encompassing Artificial Intelligence and Computer and Robotic Vision, along with Graphics Interface, is located at the University of Regina in Regina, Saskatchewan. It 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 annual awards: the Michael A.J. Sweeney Awards for the best student papers presented at the conference; the Alain Fournier Dissertation Award and the Bill Buxton Dissertation Award presented for the best Ph.D. dissertations awarded in Canada during the previous year for 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 Sheelagh Carpendale. I wish to thank the Awards committee, which consists of

Richard Bartels, University of Waterloo (emeritus),
Kellogg Booth, University of British Columbia, and
Marilyn Tremaine, Rutgers University, Chair

for their efforts in finding a well-deserving recipient.

This year's winner of the Alain Fournier Award is Dr. Tyson Broch, and of the Bill Buxton Award is Dr. Uta Hinrichs. I would like to thank Pierre Poulin, who organized the judging of the many excellent theses 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

Bill 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, 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 2013. I also wish to thank Faramarz Famil Samavati and Kirstie Hawkey, the cochairs 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

Kirstie Hawkey
Dalhousie University, Canada

Faramarz F. Samavati
University of Calgary, Canada

Graphics Interface is the oldest continuously-scheduled conference in computer graphics and human-computer interaction. The conference is now in its 39th year, dating back to 1969 when it was known as the "Canadian Man-Computer Communications Seminar". Graphics Interface was given its present name in 1982. In 2013, Graphics Interface will take place in Regina, Saskatchewan from May 29th to May 31st.

The program for Graphics Interface 2013 features 28 regular papers. We received 42 (HCI) & 26 (Graphics) submissions. After much deliberation in arriving at the final selection, we accepted 16 papers for the HCI track (~38%) and 12 papers for the Graphics track (~46%).

The GI committee comprised 17 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 others. 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 have five invited talks this year. We are proud to include keynote talks from two invited speakers: Gavin Miller, Adobe Research Imagination Lab and John T. Stasko, Georgia Institute of Technology. Both speakers are well known for their exemplary contributions to their disciplines. Our congratulations go to Sheelagh Carpendale from the University of Calgary, who is this year's recipient of the Canadian Human-Computer Communication Society's Achievement Award. Also invited are Uta Hinrichs, recipient of the 2012 award for the best doctoral dissertation completed at a Canadian university in the field of Human-Computer Interaction, and Tyson Brochu, the 2012 recipient of the Alain Fournier Award for the best Ph.D. dissertation in computer graphics to present their thesis research.

We would like to thank several people who contributed to the behind-the-scenes conference organization; especially Steve Mann, Bill Cowan, Kelly Booth, Pierre Poulin, Joaquim A. Jorge, and Meghan Haley. Thanks also go out to Mahmudul Hasan, who was the poster chair. 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

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University of Calgary, Canada

Kirstie Hawkey
Dalhousie University, Canada

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Michael A. J. Sweeney Award 2013

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 Papers 2013

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

Graphics 2013 Award Winner

"ACM: Atlas of Connectivity Maps for Semiregular Models" by Ali Mahdavi-Amiri and Faramarz Samavati.

Biographies

Ali Mahdavi-Amiri is a Ph.D. candidate in the Department of Computer Science at the University of Calgary. He is supervised by Faramarz Samavati. His research interests include geometric modeling, geometric and spatial data structures, and scientific computations.

Faramarz F. Samavati is a Professor of Computer Science at the University of Calgary. His research interests include geometric modeling, computer graphics, and visualization.

HCI 2013 Award Winner

"A Model of Navigation for Very Large Data Views" by Michael Glueck, Tovi Grossman, and Daniel Wigdor.

Biographies

Michael Glueck is a research scientist at Autodesk Research. Coupling his fascination for both psychology and computer science, Michael specialized in Human-Computer Interaction at the University of Toronto – receiving a B.Sc. in 2007 and M.Sc. in 2013.

Tovi Grossman is a Sr. Principal Research Scientist at Autodesk Research. His main research interests are understanding and improving software learnability, and exploring interaction techniques for emerging technologies.

Daniel Wigdor is an Assistant Professor of computer science at the University of Toronto, specializing in HCI. Before moving to U of T, he was a researcher at Microsoft Research, and an affiliate assistant professor at the University of Washington. His research interests include development tools for multi-device computing, software and hardware architectures for fast HCI, and new user interfaces.

Alain Fournier Award 2012

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.

Tyson Brochu

University of British Columbia
CHCCS/SCDHM Alain Fournier Award Recipient 2012

This year, Tyson Brochu is the recipient of the Alain Fournier Ph.D. Dissertation Award. His dissertation, entitled "Dynamic Explicit Surface Meshes and Applications", made several outstanding theoretical and practical research contributions to computer animation.

The quality of an animation can be significantly affected by the quality of the surfaces it depicts, especially in cases of extreme deformations and topological changes. Tyson has initiated in physics-based animation the use of explicit mesh tracking. He has introduced a framework to guarantee intersectionfree surfaces, even in the presence of thin, delicate details and topology changes. Achieving this guarantee requires exact collision detections, and he has provided an approach to find them that is fully robust, parameter-free, and computationally efficient. He has applied explicit mesh tracking to cloth and smoke simulations and in doing so, it introduces two new methods, one for vortex sheet smoke with no needs for volumetric simulation, and the other for adaptive liquid simulation with high-resolution surface tension. All these contributions have appeared in prominent venues.

Tyson completed his B.Sc. with dual majors in Computer Science and Mathematics, with great distinction, at the University of Regina in 2004, followed by his M.Sc. and Ph.D. in Computer Science at the University of British Columbia under the supervision of Professor Robert Bridson.

He has co-authored, among others, two SIGGRAPH papers, one paper in SIAM Journal of Scientific Computing, two papers at the Symposium on Computer Animation. He has co-organized a specialized SIGGRAPH course, and has been reviewer in the top computer graphics conference and journals. His expertise developed during his thesis has lead to contributions to the academy award-winning Tissue system at Weta Digital, as well as screen credits for the movies Thor and The Hobbit: An Unexpected Journey. He is now a developer at Pocket Pixels in Vancouver.

For more information, please visit: http://www.cs.ubc.ca/~tbrochu/

Bill Buxton Dissertation Award 2012

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.

Uta Hinrichs

University of Calgary
CHCCS/SCDHM Bill Buxton Dissertation Award Recipient 2012

The recipient of the 2012 award for the best doctoral dissertation completed at a Canadian university in the field of Human-Computer Interaction is Dr. Uta Hinrichs.

Her dissertation, Open-Ended Explorations in Exhibition Spaces: A Case for Information Visualization and Large Direct-Touch Displays, is an exemplary work introducing and studying novel technologies "in the wild." Her research has helped improve our understanding of the interaction challenges and design issues for deploying large interactive displays in public settings, such as in museums and art galleries. Through four very thorough and carefully planned case studies, Uta's dissertation examined questions such as how open-ended and self-guided information exploration can be promoted, how social and collaborative activities around large display exhibits unfold, how interaction and interface design of such exhibits promote or hamper social experiences, and how visitors use multi-touch gestures on walk-up-and-use large display exhibits.

The research contributions in Uta's dissertation, which are beautifully organized in a visual storyline, include: a demonstration, through installation and subsequent studies, that information visualization can be used as a means to promote open-ended explorations; evidence that serendipity is more than just luck and can be programmed for by incorporating rich visual and interactive features; and, the concept of an interaction context, i.e. that a given interaction gesture is affected by the gesture that immediately preceded it and also by the current social context such as who is present, what is being said and what visuals are on the display.

In addition to its major scientific accomplishments, Uta's work bridges many elements of science and the arts. Her museum installation was seen by over 30,000 visitors and was a finalist in the Canadian New Media Awards for 2008 in the category of Excellence in Culture, Lifestyle, and Arts. Her systems for serendipitous discovery in library settings have received significant interest from libraries across the world, will be featured at the Science and Technology Museum in Ottawa, and there has been a request for a permanent version by the University of Calgary library.

Uta also holds a Diplom (equivalent to the MSc) in Computational Visualistics from the University of Magdeburg in Germany. She earned her PhD in Computer Science with a specialization in Computational Media Design from the University of Calgary in Canada where she worked at the InnoVis Group under the supervison of Dr. Sheelagh Carpendale. She is currently a Research Fellow at SACHI, the University of St. Andrews Computer Human Interaction research group. She has over two dozen publications, including journal articles, full and short conference papers, and technical reports.

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. Regan Mandryk (University of Saskatchewan), Daniel Wigdor (University of Toronto), and Pourang Irani (University of Manitoba), chair of the committee.

For more information, please visit: http://www.utahinrichs.de/

Achievement Award 2013

Sheelagh Carpendale
University of Calgary

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 2013 members of the Awards Committee are Richard Bartels, Kellogg Booth, and Marilyn Tremaine.

The 2013 CHCCS/SCDHM Achievement Award of the Canadian Human Computer Communications Society is presented to Sheelagh Carpendale of the University of Calgary.

Sheelagh Carpendale is a Professor in the Department of Computer Science at the University of Calgary. She has a background in both the arts and the sciences. Graduating from high school with science scholarships, she instead initially opted to pursue her interests in fine arts through studies in sculpture at the Emily Carr College of Art in Vancouver, BC, and design studies in glass at the Sheridan College School of Design in Oakville, ON. During these years she worked professionally in the arts, holding various artist-in-residence positions and teaching at Humber College and other institutions, and was involved in establishing the Harbourfront Arts Centre at York Quay, in Toronto. She subsequently reconnected with her interests in math and science and earned both her B.Sc. and Ph.D. degrees in Computing Science in 1992 and 1999, respectively, from Simon Fraser University. Dr. Carpendale directs InnoVis, the Innovations in Visualization Laboratory at the University of Calgary. She holds an industrial research chair in interactive technologies co-funded by NSERC, the provincial Alberta Innovates Technology Futures program, and SMART Technologies, and also a Canada Research Chair in information visualization. Her work is highly interdisciplinary and is enabled by her training and experience in computer science and visual arts. Her artistic accomplishments have been recognised by a position as Senior Artist at the Banff New Media Institute. She has received numerous awards including both graduate supervision and research excellence awards at the University of Calgary, a service award from ACM, equipment grants from the Canada Foundation for Innovation, a University Faculty Award from NSERC, an award from the British Academy of Film and Television Arts for an interactive learning project about Antarctic waves, and most recently a prestigious E.W.R. Steacie Memorial Fellowship from NSERC.

Her research focuses on the visualization, exploration and manipulation of information through human-computer interaction with emphasis on large-surface, touch-sensitive displays. She builds on her broad interdisciplinary research expertise — including fine arts, psychology, ethnography, information visualization, and human computer interaction — to design innovative, people-centred information technologies. Her bibliography contains more than 120 refereed journal and conference articles and over a dozen artistic exhibits and installations, in addition to numerous other contributions including the co-authored Sketching User Experiences: The Workbook (2012). Dr. Carpendale's interdisciplinary research approach, drawing from fine arts, design, and computer science, is used to investigate the visualization of information and to design modes of human computer interaction. This has resulted in the design of innovative information technologies that are made more accessible to their users by observing how people interact with information displays, with interface components, and with other participants and using those observations to develop more controllable, approachable and comprehensible visual representations of data. A dominant theme throughout her work has been the cooperative and collaborative use of large displays at which several people can collectively engage in navigation, exploration, and manipulation of information spaces. She has pioneered the use of touch-sensitive tables in this field through a variety projects that explore the thematic areas of visualization, display, design, rendering, evaluation of modes of interaction and presentation, and computer-assisted collaboration in which she has supervised or co-supervised over thirty graduate student dissertations, theses, and diplomas. She is currently investigating a number of issues related to personal visual analytics with applications to financial management, health care, sustainability, and other areas of everyday life with the goal of producing interactive visualizations of digital data in a manner that enhances people's cognitive abilities to deal with their own information.

Her research has already been realized in patents and products and many of her students have held industrial research internships with Canadian and international companies. Most notably, her work in developing touch-sensitive tabletop display applications has led to a partnership with Calgary-based SMART Technologies, where her research group has influenced the development of SMART's interactive whiteboards and influenced SMART to now include interactive tabletops as part of their line of multi-touch displays for classrooms and offices. A recent patent application for three-dimensional, tabletop interaction techniques invented by Dr. Carpendale and her research group continues this partnership with SMART.

Keynote Speaker

From Research to Products: Adobe's Imagination Lab Themes and Projects

Gavin Miller
Director of the Adobe Research Imagination Lab, USA

Abstract

The talk will present the lab's model for industrial research that has an impact on the company's products as well as contributing to academic publications. Plenty of example projects will illustrate the diversity of topics covered as well as how certain research themes evolved over time. The talk will also explore technology trends and research themes that may be increasingly important in the future, such as emerging display technologies and robotics.

Biography

Gavin Miller is an Adobe Fellow and director of the Adobe Research Imagination Lab. He obtained a First in the Electrical Sciences Tripos in 1983, and a Ph.D. in 1987, from Cambridge University. From 1986 to 1988 he worked as the Project Leader of Natural Phenomena at Alias Research, Inc. in Canada, before joining the Advanced Technology Group at Apple Computer Incorporated, where he published research on simulation-based animation and interactive multi-media. This work included algorithms for QuickTime VR and one of the first virtual museums. From 1997 to 2000 he was a Member of the Research Staff at Interval Research Inc. where he worked on immersive and low latency graphics systems. From 2000 he has worked at Adobe, initially on a new product, called Adobe Atmosphere, and then leading a team working on a GPU-acceleration abstraction layer called PixelBender that was part of several Adobe Products. He also founded a research group to develop techniques for high-performance computing. Merging this with another research group, he then ran the Visual Computing Group until 2012. Since 2012 he has been the director of the Adobe Research Imagination Lab which includes the Systems Technology Lab, specializing in analytics, distributed systems and video systems, as well as several graphics and computer vision research groups. His personal research interests include light-field photography, real-time and photo-realistic rendering, procedural modeling of ornamental shapes, 3D printing and physically-based locomotion for animation and robotics.

For more information, please visit: http://www.adobe.com/technology/people/san-jose/gavin-miller.html

Keynote Speaker

The Value of Visualization for Exploring and Understanding Data

John T. Stasko
Georgia Institute of Technology, USA

Abstract

Investigators have an ever-growing suite of tools available for analyzing and understanding their data. While techniques such as statistical analysis, machine learning, and data mining all have benefits, visualization provides an additional unique set of capabilities. In this talk I will identify the particular advantages that visualization brings to data analysis beyond other techniques, and I will describe the situations when it can be most beneficial. To help support these arguments, I'll present a number of provocative examples from my own work and others'. One particular system will demonstrate how visualization can facilitate exploration and knowledge acquisition from a collection of thousands of narrative text documents, in this case, reviews of wines from Tuscany.

Biography

John T. Stasko is a Professor in and the Associate Chair of the School of Interactive Computing at the Georgia Institute of Technology. He is an internationally recognized and widely published researcher in the area of human-computer interaction, with a specific focus on information visualization and visual analytics. His Information Interfaces Research Group (http://www.cc.gatech.edu/gvu/ii) develops ways to help people and organizations explore, analyze, and make sense of data in order to solve problems. Stasko has been Papers Cochair for IEEE Information Visualization (InfoVis) Conference, the IEEE Visual Analytics Science and Technology (VAST) Conference, and the ACM Software Visualization (SoftVis) Symposium. He also has served on numerous journal editorial boards including ACM Transactions on Computer-Human Interaction, IEEE Transactions on Visualization and Computer Graphics, and Information Visualization. He was named an ACM Distinguished Scientist in 2011, and he received the IEEE VGTC Visualization Technical Achievement Award in 2012.

For more information, please visit: http://www.cc.gatech.edu/~stasko/

Invited Speakers

Information Visualization: Exploring New Options

Sheelagh Carpendale
University of Calgary, Canada

Abstract

Much of the excitement in the early 1990s about information visualization originated in the idea of creating new visual, spatial representations that would allow people to 'see' their data. Much was said about the amount of the brain that is devoted to spatial and visual reasoning and how visualizations might have the power to utilize these relatively untapped resources. However, as information visualization research has progressed a degree of practically has emerged – heightening a focus on usability and task enablement. As important as this focus maybe, there may still be something worth investigating in the notion of alternate representations. In this talk, I will explore the possible power of alternate interactive visual representations by considering both ideas around innovation and practical illustrations.

Biography

Sheelagh Carpendale is a Professor at the University of Calgary where she holds a Canada Research Chair in Information Visualization and an NSERC/AITF/SMART Industrial Research Co-Chair in Interactive Technologies. In 2012 she was awarded the NSERC Steacie Fellowship. She directs the Innovations in Visualization (InnoVis) research group and founded the interdisciplinary graduate group, Computational Media Design. Her research on information visualization, large interactive displays, and new media art draws on her dual background in Computer Science (BSc. and Ph.D. Simon Fraser University) and Visual Arts (Sheridan College, School of Design and Emily Carr, College of Art). She is an internationally renowned leader in both information visualization and multi-touch tabletop interaction and has recently served in such roles as Papers, Program, or Conference Chair for IEEE InfoVis, Computational Aesthetics, ACM Tabletop, and EEEI PacificVis and has received both the IEEE and ACM recognition of service awards.

For more information, please visit: http://pages.cpsc.ucalgary.ca/~sheelagh/wiki/pmwiki.php

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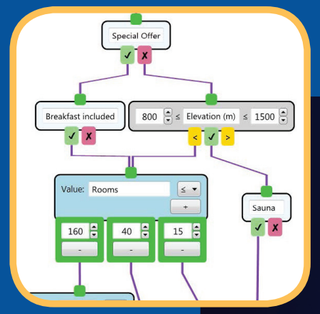

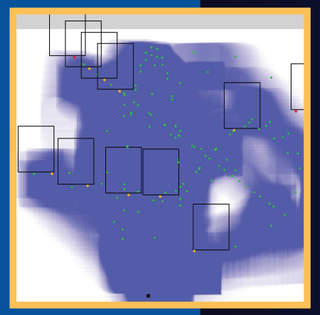

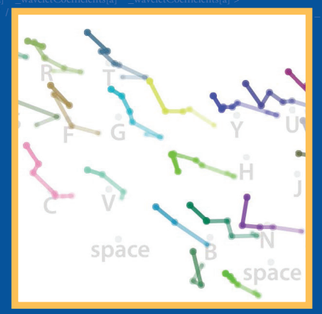

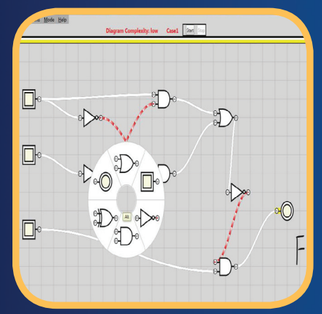

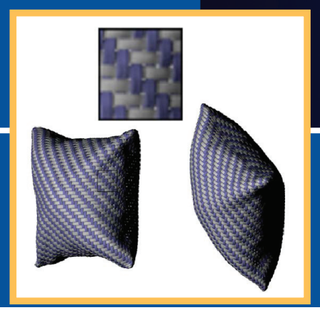

www.graphicsinterface.org
www.crcpress.com

ISSN 0713-5424
ISBN 978-1-4822-1680-6

Proceedings

Graphics **Interface** 2013

29 - 31 May 2013
Regina, Saskatchewan, Canada

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

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Effects of Hand Drift while Typing on Touchscreens; Frank Chun Yat Li, Leah Findlater, Khai N. Truong (Page 95).

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User Perceptions of Drawing Logic Diagrams with Pen-Centric User; Bo Kang, Jared N. Bott, Joseph J. LaViola Jr. (Page 79).

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Dynamics Based 3D Skeletal Hand Tracking; Stan Melax, Leonid Keselman, Sterling Orsten (Page 63).

Evaluating the Readability of Extended Filter/Flow Graphs; Florian Haag, Steffen Lohmann, Thomas Ertl (Page 33).

Adaptive Difficulty in Exergames for Parkinson's disease Patients; Jan Smeddinck, Sandra Siegel, Marc Herrlich (Page 141).

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