

Exhibit 1

Ravin Balakrishnan

Curriculum Vitae

Contact information

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Education

Ph.D. Computer Science, University of Toronto, Canada. Feb 2001.

Thesis: "Issues in Bimanual Interaction for Computer Graphics."

Advisor: Prof. Bill Buxton

Advisory Committee: Prof. Mark Chignell, Prof. Eugene Fiume, Prof. Scott MacKenzie

M.Sc. Computer Science, University of Toronto, Canada. Jan 1997.

Thesis: "The Evolution and Evaluation of a 3D Input Device."

Advisor: Prof. Bill Buxton

B.Sc. (1st Class Honours), Computer Science, University of New Brunswick, Canada. May 1993.

Employment

Professor (tenured), Department of Computer Science, University of Toronto, 2011 – present.

Canada Research Chair (CRC-Tier II) in Human-Centred Interfaces, Department of Computer Science,
University of Toronto, March 2006 – present.

Associate Professor (tenured), Department of Computer Science, University of Toronto, 2006- 2011.

Canada Research Chair (CRC-Tier II) in Human-Centred Interfaces, Department of Computer Science,
University of Toronto, March 2006 – present.

Associate Chair, Research and Industrial Relations, Department of Computer Science, University of Toronto. July 1,
2008 – June 30, 2010.

Assistant Professor (tenure-track), Department of Computer Science, University of Toronto, 2001 –2006. Appointed
as Full Member of the Graduate Faculty in 2001.

Researcher, User Interface Research Group, Alias|wavefront (now Autodesk), Aug 1996 – July 2001.

Conducted basic and applied research on interfaces for interactive 3D graphics, alternate multi degree-of-
freedom input devices, two-handed input, haptic feedback interfaces, tablet based input, and large scale
displays. Some of the ideas and interaction techniques developed in this research have been incorporated
into Alias|wavefront's market leading software products for 3D design, modeling, and animation.

Instructor, Dept. of Computer Science, University of Toronto, May 1995 – Aug 2000, on a per course basis.

Lectured and took complete responsibility, including managing several teaching assistants, for various
undergraduate courses (listed in section entitled "Teaching" below).

Teaching Assistant, Dept. of Computer Science, University of Toronto. Sep 1993 - Dec 1996.

Conducted tutorials and marked assignments, tests, and exams for various courses (listed in section entitled
"Teaching" below).

Research Assistant, Human Computer Interaction Laboratory, University of New Brunswick, May - Sept 1993.

Worked with Prof. Colin Ware on empirical research into the effects of lag in fishtank virtual reality environments. Also helped design, build, and evaluate a haptic feedback input/output device.

Programmer Analyst, Indigo Software Ltd, Ottawa, Canada. Sep - Dec 1990, May - Aug 1991, Jan - May 1992.

Visiting and consulting activities

Expert witness for Apple (respondent) through Weil, Gotshal & Manges, LLP, in a patent infringement action at the ITC brought by Elan Microelectronics. In re Certain Electronic Devices with Multi-Touch Enabled Touchpads. No. 337-TA-658. 2010-present.

Visiting researcher, HPLabs Bangalore, India. Feb 2009.

Expert witness for Nintendo (respondent) through Covington and Burling, LLP, in a patent infringement action at the ITC brought by Hillcrest Laboratories. In re Certain Video Game Machines and Related Three-Dimensional Pointing Devices, Inv. No. 337-TA-658. 2008-2009.

Visiting researcher, Microsoft Research - Redmond, Beijing, Bangalore and Cambridge labs. July 2007 – June 2008.

Visiting professor, Laboratoire de Recherche en Informatique (LRI), Université Paris-Sud. France. June-July, 2006

Visiting researcher, Mitsubishi Electric Research Lab (MERL), Cambridge, MA, USA. Feb 2005 – Mar 2007.

Entrepreneurial Activities

Co-founder, Arcestra www.arcestra.com (formerly Sketch2 Corp). Developing software for designing 3D building interior layouts. The concept grew out of research conducted in my lab with my colleague Prof. Karan Singh and graduate students Steven Tsang and Abhishek Ranjan.

Co-founder, Bump Technologies Inc. www.bumptop.com. Acquired by Google in May, 2010. Developed a physically realistic desktop user interface system, which grew out of research conducted in my lab with graduate student Anand Agarawala..

Research endeavours

Human-computer interaction, computer mediated human-human interaction, data visualization, information and communications technology for development.

Specific research interests:

Input devices, sensing technologies, interaction techniques. In particular, gestural, sketching, and multi degree-of-freedom interaction, interfaces to small and/or mobile computers, interfaces to displays of the future.

User interfaces and interaction techniques for data visualization.

Empirical evaluation of user interfaces including associated metrics and predictive models of human performance.

Ambient, pervasive, and ubiquitous computing.

Computer supported collaborative work (CSCW).

Interfaces and systems for educational and healthcare applications in developing economies.

Awards, fellowships, scholarships

Elected to the ACM CHI Academy in 2011.

Dean's Excellence Award, Faculty of Arts and Science, University of Toronto. 2010.

Best paper at the ACM CHI 2010 Conference on Human Factors in Computing Systems.

Best paper honorable mention award at the ACM CSCW 2010 Conference on Computer Supported Cooperative Work.

Dean's Excellence Award, Faculty of Arts and Science, University of Toronto. 2009.

Best paper honorable mention award at the ACM CHI 2009 Conference on Human Factors in Computing Systems.

Dean's Excellence Award, Faculty of Arts and Science, University of Toronto. 2008.

Best paper honorable mention award at the ACM CHI 2008 Conference on Human Factors in Computing Systems.

Alfred P. Sloan Research Fellowship. 2007-2009. US\$45,000.

Dean's Excellence Award, Faculty of Arts and Science, University of Toronto. 2007.

Canada Research Chair (CRC-Tier II) in Human-Centred Interfaces, University of Toronto, March 2006 – present.

Dean's Excellence Award, Faculty of Arts and Science, University of Toronto. 2006.

Best paper honorable mention award at the ACM CSCW 2006 Conference on Computer Supported Cooperative Work.

Best student paper award at the ACM UIST 2006 Symposium on User Interface Software and Technology.

Best paper award at the Graphics Interface 2005 Conference.

Dean's Excellence Award, Faculty of Arts and Science, University of Toronto. 2005.

Best paper award at the ACM CHI 2005 Conference on Human Factors in Computing Systems.

Best paper award at the ACM UIST 2004 Symposium on User Interface Software and Technology.

Dean's Excellence Award, Faculty of Arts and Science, University of Toronto. 2004.

Ontario Premier's Research Excellence Award (PREA). 2003. \$100,000.

IBM Toronto Centre for Advanced Studies Faculty Fellow (2003-present).

Bell University Laboratories Associate Chair in Human Computer Interaction, U. of Toronto, Jan 2002 – 2006.

Ph.D. fellowship from Alias|wavefront, \$30,000 per annum plus travel/research expenses, Sep 1996 – July 2001.

University of Toronto, Dept. of Computer Science award for outstanding Teaching Assistant, 1994.

University of Toronto Open Fellowship, \$4500, Sep - Dec 1994 .

University of Toronto Connaught Scholarship, \$13,500 plus tuition fees, Sep 1993 - Aug 1994.

Harry Levine Award for outstanding graduating student in Computer Science, University of New Brunswick, 1993.

University of New Brunswick, Dept. of Computer Science Dean's List, 1990, 1991, 1992, 1993.

Research Grants

(Unless otherwise indicated, all figures are in Canadian dollars and I am the sole investigator/recipient of the following grants and awards)

Network Investigator in the "GRAND Networks Centres of Excellence". PI: Kellogg Booth. \$55,000 for 2010.

HPLabs India unrestricted gift. Jan 2010. US\$15,000 cash.

"Going beyond the surface".

Microsoft Research unrestricted gift. 1 July 2009. US\$100,000 cash + hardware donation valued at approximately US\$15,000.

"3-D visualization and gestural interaction with multimodal neurological data."

NSERC Strategic Project Grants Supplemental Competition, 1 April 2008 – 31 March 2010, \$196,000 over 2 years (\$98,000 per year).

PI: Jeremy Cooperstock. Co-investigators: Ravin Balakrishnan, Tal Arbel, Louis Collins.

"Multi channel and multi degree-of-freedom user interfaces for heterogeneous display environments."

NSERC discovery accelerator supplement grant, 1 April 2007 – 31 March 2010, \$120,000 over 3 years (\$40,000 per year)

"Multi channel and multi degree-of-freedom user interfaces for heterogeneous display environments."

NSERC discovery grant, 1 April 2007 – 31 March 2012, \$166,000 over 5 years (\$33,200 per year)

“Multi-Scale Environments”

INRIA "Equipes Associées" grant. 60,000 Euros over 3 years beginning Jan 2007.

PIs: Wendy Mackay and Ravin Balakrishnan

“3D Sketch Graphics Software Development Project”.

NSERC Idea to Innovation (I2I) Phase 2 grant. \$125,000 for one year, 2006.

PI: Karan Singh. Co-investigator: Ravin Balakrishnan

“Management, Access, and Visualization of Archived Meeting Transcripts”,

NSERC Collaborative Research and Development (CRD) grant. \$360,000 over 3 years beginning 1 Jan 2006.

PI: Charles Clarke. Co-investigators: Ravin Balakrishnan, Mark Chignell, Sharon Strauss.

“3D Sketch Graphics Software Development Project”.

NSERC Idea to Innovation (I2I) Phase 1 grant. \$125,000 for one year, 2005.

PI: Karan Singh. Co-investigator: Ravin Balakrishnan

“3D Sketching with a Suggestion Database”.

CITO Technical Readiness grant. \$25,000, for one year, 2005.

PI: Karan Singh. Co-investigator: Ravin Balakrishnan

“3D Sketching Software”

NSERC IPM grant. \$50,000, for one year, 2005.

PI: Karan Singh. Co-investigator: Ravin Balakrishnan

“Improved Medical Collaboration and Case Management: Capture, Structuring and Dissemination of Spoken Discussion”.

CITO research grant. \$280,000 over two years beginning 1 Sep 2004.

PI: Mark Chignell. Co-investigators: Ravin Balakrishnan, Charles Clarke, Sharon Strauss.

“Next Generation User Interfaces for Data Visualization”

NSERC strategic grant. \$263,800 over the period 1 Jan 2004 – 31 Dec 2006.

PI: Ravin Balakrishnan. Co-investigator: Karan Singh

“User Interfaces for Database Visualization”

CITO student internship program grant, \$15,000, 1 Jan – 31 Dec 2004.

“Network for Effective Collaboration Technologies through Advanced Research”

NSERC research network grant. \$5.5million over 5 years beginning Jan 2004.

PI: Ron Baecker. Co-investigators: Ravin Balakrishnan, Saul Greenberg, Carl Gutwin, Kellogg Booth, Sheelagh Carpendale, Kori Inkpen, Gerald Penn, Kostas Plataniotis, Elaine Toms, Roel Vertegaal.

“Memories of Synchronicity: Knowledge Management and Visualization of Interaction Transcripts in Innovative Collaboration Environments”

IBM-ARISE research grant. Sept 2003 – Aug 2006, \$450,000.

PI: Mark Chignell. Co-investigators: Ravin Balakrishnan, Charles Clarke.

“Mathematical Surface Representations for Conceptual Design”

Mathematics of Information Technology and Complex Systems (MITACS) grant.

Original award: May 2003 – Apr 2005, \$180,000.

Additional award: May 2005 – ongoing, \$180,000

PI: Karan Singh. Co-investigators: Ravin Balakrishnan, Eugene Fiume, Pierre Poulin, Michiel van de Panne, Richard Zhang.

“Tablet Interfaces”

Microsoft Research unrestricted gift. July 2003. US\$25,000 cash.

“Laboratory for human-computer interaction and computer graphics”

CFI New Opportunities Fund grant. 2003-2007. \$994,066. 40% CFI, 40% OIT, 20% from industrial partners

PI: Ravin Balakrishnan. Co-investigator: Karan Singh.

“Laboratory for human-computer interaction and computer graphics”

CFI Infrastructure Operating Fund grant. 2004-2006. \$132,000.

PI: Ravin Balakrishnan. Co-investigator: Karan Singh.

“User interfaces for 3D environments”

IBM Centre for Advanced Studies grant to support my Ph.D. student, Michael McGuffin. 1 Jan 2003 – 31 Dec 2005
\$102,000 cash + \$23,000 in-kind.

“Tilting text input for mobile devices.”

Microsoft Research unrestricted gift. 1 Jan 2003. US\$25,000 cash + hardware donation valued at approximately US\$5,000.

“User interfaces for volumetric displays.”

Connaught Fund matching grant, 1 April 2002 – 31 March 2003. \$30,000 (+\$15,000 from the department)

“Laboratory for large scale high resolution interaction, graphics and vision research.”

NSERC equipment grant, 1 April 2002 – 31 March 2003, \$96,792

PI: Ravin Balakrishnan. Co-investigators: Karan Singh, Kyros Kutulakos, Eugene Fiume

“Multi-channel and multi degree-of-freedom interaction with large displays.”

NSERC discovery grant, 1 April 2002 – 31 March 2007, \$140,000 over 5 years (\$28,000 per year)

“Techniques for multi-channel and multi degree-of-freedom interaction.”

Connaught startup grant, 1 July 2001 – 30 June 2003, \$10,000.

Bell University Laboratories startup funding, 1 July 2001 – 31 Dec 2003, \$60,000

Publications

Copies of the following papers and related videos are available online at www.dgp.toronto.edu/~ravin/#publications

A note on publication venues: in my primary area of research in Human Computer Interaction (HCI), the ACM Conference on Human Factors in Computing Systems (CHI) is considered one of the best forums for dissemination of research results and covers the broad spectrum of research in HCI. The ACM Symposium on User Interface Software and Technology (UIST), the ACM Conference on Computer Supported Cooperative Work (CSCW), and the European Conference on Computer Supported Cooperative Work (ECSCW) are also of similar quality, but are focused on particular sub-areas of the field. Papers in these conferences are refereed as full papers, and have an acceptance rate of around 15-25% each year. The top journals in the HCI field are the ACM Transactions on Computer-Human Interaction, the Human Computer Interaction journal, and the International Journal of Human Computer Studies. I also do research in the fields of Information Visualization and Information and Communication Technologies for Development (ICTD) where the IEEE Visualization Conference, IEEE Information Visualization Symposium, and the IEEE/ACM International Conference on Information and Communication Technologies for Development are the top publication venues with acceptance rates of around 20-30%.

Refereed journal papers

- J1. Daniel Vogel, Ravin Balakrishnan. (2010). Direct pen interaction with a conventional graphical user interface. *Human-Computer Interaction, 1532-7051, Volume 25, Issue 4.* p. 324 – 388.
- J2. Jeremy Birnholtz, Abhishek Ranjan, Ravin Balakrishnan. (2010). Providing dynamic visual information for collaborative tasks: Experiments with automatic camera control. *Human-Computer Interaction, 1532-7051, Volume 25, Issue 3.* p. 261 – 287.
- J3. Jennifer Keelan, Vera Pavri, Ravin Balakrishnan, Kumanan Wilson. (2010). An analysis of the Human Papilloma Virus vaccine debate on MySpace blogs. *Vaccine, 28(6).* p. 1535-1540
- J4. Gery Casiez, Daniel Vogel, Ravin Balakrishnan, Andy Cockburn. (2008). The impact of control-display gain on user performance in pointing tasks. *Human-Computer Interaction, 23(3).* p. 215-250.
- J5. Michael McGuffin, Ravin Balakrishnan. (2005). Fitts' law and expanding targets: Experimental studies and designs for user interfaces. *ACM Transactions on Computer-Human Interaction, 12(4).* p. 388-422.

- J6. Tovi Grossman, Ravin Balakrishnan. (2005). A probabilistic approach to modeling two-dimensional pointing. *ACM Transactions on Computer-Human Interaction*, 12(3). p. 435-459.
- J7. Anastasia Bezerianos, Ravin Balakrishnan. (2005). Canvas portals: view and space management on large displays. *IEEE Computer Graphics and Applications* 25(4). p. 34-43.
- J8. Ravin Balakrishnan. (2004). "Beating" Fitts' law: Virtual enhancements for pointing facilitation. *International Journal of Human-Computer Studies*, 61(6). p. 857-874.
- J9. George W. Fitzmaurice, Azam Khan, William Buxton, Gordon Kurtenbach, Ravin Balakrishnan. (2003). Sentient data access via a diverse society of devices. *ACM Queue*, November 2003. p. 53-62.
- J10. Ravin Balakrishnan, George W. Fitzmaurice, Gordon Kurtenbach. (2001). User interfaces for volumetric displays. *IEEE Computer*, March 2001. p. 37-45.
- J11. William Buxton, George W. Fitzmaurice, Ravin Balakrishnan, Gordon Kurtenbach. (2000). Large displays in automotive design. *IEEE Computer Graphics and Applications*, July/August 2000. p. 68-75.
- J12. George W. Fitzmaurice, Ravin Balakrishnan, Gordon Kurtenbach. (1999). Sampling, synthesis, and input devices. *Communications of the ACM*, August 1999, 42(8). p. 54-63.
- J13. Colin Ware, Ravin Balakrishnan. (1994). Reaching for objects in VR displays: Lag and frame rate. *ACM Transactions on Computer-Human Interaction*, 1(4). p. 331-356.

Refereed conference full-length papers

- C1. Akhil Mathur, Divya Ramachandran, Ed Cutrell, Ravin Balakrishnan. (in press – 2011). An exploratory study on the use of camera phones and pico projectors in rural India. To appear in the *Proceedings of MobileHCI 2011*.
- C2. Mohit Jain, Jeremy Birnholtz, Ed Cutrell, Ravin Balakrishnan. (in press – 2011). Exploring display techniques for mobile collaborative learning in developing regions. To appear in the *Proceedings of MobileHCI 2011*.
- C3. Jian Zhao, Fanny Chevalier, Ravin Balakrishnan. (in press - 2011). KronoMiner: Using multi-foci navigation for the visual exploration of time-series data. To appear in the *Proceedings of CHI 2011 – the ACM Conference on Human Factors in Computing Systems*.
- C4. Chun Yu, Yuanchun Shi, Ravin Balakrishnan, Xiangliang Meng, Yue Suo, Mingming Fan, Yongqiang Qin. (2010). The satellite cursor: achieving MAGIC pointing without gaze tracking using multiple cursors. *Proceedings of UIST 2010 – the ACM Symposium on User Interface Software and Technology*. p. 163-172.
- C5. James Scott, Shahram Izadi, Leila Rezai, Dominika Ruskowski, Xiaojun Bi, Ravin Balakrishnan. (2010). RearType: Text entry using keys on the back of a device. *Proceedings of MobileHCI 2010*. p. 171-179.
- C6. Abhishek Ranjan, Jeremy Birnholtz, Rorik Henrikson, Ravin Balakrishnan, Dana Lee. (2010). Automatic camera control using unobtrusive vision and audio tracking. *Proceedings of GI 2010 – the Graphics Interface Conference*. p. 47-54.
- C7. Daniel Vogel, Ravin Balakrishnan. (2010). Occlusion-aware interfaces. *Proceedings of CHI 2010 – the ACM Conference on Human Factors in Computing Systems*. p. 263-272. [**ACM CHI 2010 Best Paper Award**]
- C8. Patrick Dubroy, Ravin Balakrishnan. (2010). A study of tabbed browsing among Mozilla Firefox users . *Proceedings of CHI 2010 – the ACM Conference on Human Factors in Computing Systems*. p. 673-682.
- C9. Xiaojun Bi, Seok-Hyung Bae, Ravin Balakrishnan. (2010). Effects of interior bezels of tiled-monitor large displays on visual search, tunnel steering, and target selection . *Proceedings of CHI 2010 – the ACM Conference on Human Factors in Computing Systems*. p. 65-74.
- C10. Saleema Amershi, Meredith Ringel Morris, Neema Moraveji, Ravin Balakrishnan, Kentaro Toyama. (2010). Multiple mouse text entry for single-display groupware. *Proceedings of CSCW 2010 – the ACM Conference*

on Computer Supported Cooperative Work. p. 169-178. [**ACM CSCW 2010 Best Paper Honorable Mention Award**]

- C11. Seok-Hyung Bae, Ravin Balakrishnan, Karan Singh. (2009). EverybodyLovesSketch: 3D sketching for a broader audience. *Proceedings of UIST 2009 – the ACM Symposium on User Interface Software and Technology*. p. 59-68.
- C12. Scott Saponas, Desney Tan, Dan Morris, Ravin Balakrishnan, Jim Turner, James Landay. (2009). Enabling always-available input with muscle-computer interfaces. *Proceedings of UIST 2009 – the ACM Symposium on User Interface Software and Technology*. p. 167-176.
- C13. Gursharan Singh, Leah Findlater, Kentaro Toyama, Scott Helmer, Rikin Gandhi, Ravin Balakrishnan. Numeric paper forms for NGOs. (2009). *Proceedings of ICTD 2009 – the IEEE/ACM International Conference on Information and Communication Technologies and Development*. p. 406-416.
- C14. Gerry Chu, Sambit Satpathy, Kentaro Toyama, Rikin Gandhi, Ravin Balakrishnan. (2009). Featherweight multimedia for information dissemination. *Proceedings of ICTD 2009 – the IEEE/ACM International Conference on Information and Communication Technologies and Development*. p. 337-347.
- C15. Daniel Vogel, Matthew Cudmore, Gery Casiez, Ravin Balakrishnan, Liam Keliher. (2009). Hand occlusion with tablet-sized direct pen input. *Proceedings of CHI 2009 – the ACM Conference on Human Factors in Computing Systems*. p. 557-566.
- C16. Xiaojun Bi, Ravin Balakrishnan. (2009). Comparing usage of a large high-resolution display to single or dual desktop displays for daily work. *Proceedings of CHI 2009 – the ACM Conference on Human Factors in Computing Systems*. p. 1005-1014.
- C17. Clifton Forlines, Ravin Balakrishnan. (2009). Improving visual search with image segmentation. *Proceedings of CHI 2009 – the ACM Conference on Human Factors in Computing Systems*. p. 1093-1102. [**ACM CHI 2009 Best Paper Nominee**]
- C18. Leah Findlater, Ravin Balakrishnan, Kentaro Toyama. (2009). Comparing semiliterate and illiterate users' ability to transition from audio+text to text-only interaction. *Proceedings of CHI 2009 – the ACM Conference on Human Factors in Computing Systems*. p. 1751-1760.
- C19. Ken Hinckley, Morgan Dixon, Raman Sarin, Francois Guimbretiere, Ravin Balakrishnan. (2009). Codex: A dual screen computer. *Proceedings of CHI 2009 – the ACM Conference on Human Factors in Computing Systems*. p. 1933-1942.
- C20. Neema Moraveji, Kori Inkpen, Ed Cutrell, Ravin Balakrishnan. (2009). A mischief of mice: Examining children's performance in single display groupware systems with 1 to 32 mice. *Proceedings of CHI 2009 – the ACM Conference on Human Factors in Computing Systems*. p.2157-2166.
- C21. Xiang Cao, Michael Massimi, Ravin Balakrishnan. (2008). Flashlight Jigsaw: An exploratory study of an ad-hoc multi-player game on public displays. *Proceedings of CSCW 2008 – the ACM Conference on Computer Supported Cooperative Work*. p. 77-86.
- C22. Hrvoje Benko, Andrew Wilson, Ravin Balakrishnan. (2008). Sphere: Multi-touch interactions on a spherical display. *Proceedings of UIST 2008 – the ACM Symposium on User Interface Software and Technology*. p. 77-86.
- C23. Xiaojun Bi, Tomer Moscovich, Gonzalo Ramos, Ravin Balakrishnan, Ken Hinckley. (2008). An exploration of pen rolling for pen-based interaction. *Proceedings of UIST 2008 – the ACM Symposium on User Interface Software and Technology*. p. 191-200.

- C24. Seok-Hyung Bae, Ravin Balakrishnan, Karan Singh. (2008). ILoveSketch: As-natural-as-possible sketching system for creating 3D curve models. *Proceedings of UIST 2008 – the ACM Symposium on User Interface Software and Technology*. p. 151-160.
- C25. Xiang Cao, Andrew Wilson, Ravin Balakrishnan, Ken Hinckley, Scott E. Hudson. (2008). ShapeTouch: Leveraging contact shape on interactive surfaces. *Proceedings of TABLETOP 2008 – the IEEE International Workshop on Horizontal Interactive Human Computer Systems*. p. 139-146.
- C26. Archana Prasad, Indrani Medhi, Kentaro Toyama, Ravin Balakrishnan. (2008). Exploring the feasibility of video mail for illiterate users. *Proceedings of AVI 2008 - the Conference on Advanced Visual Interfaces*. p. 103-110.
- C27. Ryan Schmidt, Karan Singh, Ravin Balakrishnan. (2008). Sketching and composing widgets for 3D manipulation. *Computer Graphics Forum, 27(2), Proceedings of Eurographics Conference*. p. 301-310.
- C28. Scott Saponas, Desney Tan, Dan Morris, Ravin Balakrishnan. (2008). Demonstrating the feasibility of using forearm electromyography for muscle-computer interfaces. *Proceedings of CHI 2008 – the ACM Conference on Human Factors in Computing Systems*. p. 515-524.
- C29. Xiang Cao, Jacky Jie Li, Ravin Balakrishnan. (2008). Peephole pointing: Modeling acquisition of dynamically revealed targets. *Proceedings of CHI 2008 – the ACM Conference on Human Factors in Computing Systems*. p. 1699-1708. [ACM CHI 2008 Best Paper Nominee]
- C30. Tovi Grossman, Ravin Balakrishnan. (2008). Collaborative interaction with volumetric displays. *Proceedings of CHI 2008 – the ACM Conference on Human Factors in Computing Systems*. p. 383-392.
- C31. Clifton Forlines, Ravin Balakrishnan. (2008). Evaluating tactile feedback and direct vs. indirect stylus input in pointing and crossing selection tasks. *Proceedings of CHI 2008 – the ACM Conference on Human Factors in Computing Systems*. p. 1563-1572.
- C32. Abhishek Ranjan, Jeremy Birnholtz, Ravin Balakrishnan. (2008). Improving meeting capture by applying television production principles with audio and motion detection. *Proceedings of CHI 2008 – the ACM Conference on Human Factors in Computing Systems*. p. 227-238.
- C33. Pierre Dragicevic, Gonzalo Ramos, Jacobo Bibliowicz, Derek Nowrouzezahrai, Ravin Balakrishnan, Karan Singh. (2008). Video browsing by direct manipulation. *Proceedings of CHI 2008 – the ACM Conference on Human Factors in Computing Systems*. p. 237-246.
- C34. Xiang Cao, Clifton Forlines, Ravin Balakrishnan. (2007). Multi-user interaction using handheld projectors. *Proceedings of UIST 2007 – the ACM Symposium on User Interface Software and Technology*. p. 43-52.
- C35. Shengdong Zhao, Pierre Dragicevic, Mark Chignell, Ravin Balakrishnan, Patrick Baudisch. (2007). earPod: Eyes-free menu selection using touch input and reactive audio feedback. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 1395-1404.
- C36. Clifton Forlines, Chia Shen, Daniel Wigdor, Ravin Balakrishnan. (2007). Direct-touch vs. mouse input for tabletop displays. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 647-656.
- C37. Gonzalo Ramos, Ravin Balakrishnan. (2007). Pressure marks. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 1375-1384.
- C38. Gonzalo Ramos, Andy Cockburn, Ravin Balakrishnan, Michel Beaudoin-Lafon. (2007). Pointing lenses. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 757-766.

- C39. Abhishek Ranjan, Jeremy Birnholtz, Ravin Balakrishnan. (2007). Dynamic shared visual spaces: Experimenting with automatic camera control in a remote repair task. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 1177-1186.
- C40. Daniel Wigdor, Chia Shen, Clifton Forlines, Ravin Balakrishnan. (2007). Perception of elementary graphical elements in tabletop and multi-surface environments. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 473-482.
- C41. Jeremy Birnholtz, Tovi Grossman, Clarissa Mak, Ravin Balakrishnan. (2007). An exploratory study of input configuration and group process in a negotiation task using a large display. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 91-100.
- C42. Tovi Grossman, Nicholas Kong, Ravin Balakrishnan. (2007). Modeling pointing at targets of arbitrary shapes. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 463-472.
- C43. Tovi Grossman, Daniel Wigdor, Ravin Balakrishnan. (2007). Exploring and reducing the effects of orientation on text readability in volumetric displays. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 483-492.
- C44. Tovi Grossman, Pierre Dragicevic, Ravin Balakrishnan. (2007). Strategies for accelerating on-line learning of hotkeys. *Proceedings of CHI 2007 – the ACM Conference on Human Factors in Computing Systems*. p. 1591-1600.
- C45. Jia Sheng, Ravin Balakrishnan, Karan Singh. (2006). An interface for 3D sculpting via physical proxy. *Proceedings of GRAPHITE 2006 – International Conference on Computer Graphics and Interactive Techniques in Australasia and Southeast Asia*. p. 213-220.
- C46. Abhishek Ranjan, Jeremy Birnholtz, Ravin Balakrishnan. (2006). An exploratory analysis of partner action and camera control in a video-mediated collaborative task. *Proceedings of CSCW 2006 – the ACM Conference on Computer Supported Cooperative Work*. p. 403-412. [**ACM CSCW 2006 Best Paper Honorable Mention Award**]
- C47. Clifton Forlines, Chia Shen, Daniel Wigdor, Ravin Balakrishnan. (2006). Exploring the effects of group size and display configuration on visual search. *Proceedings of CSCW 2006 – the ACM Conference on Computer Supported Cooperative Work*. p. 11-20.
- C48. Xiang Cao, Ravin Balakrishnan. (2006). Interacting with dynamically defined information spaces using a handheld projector and a pen. *Proceedings of UIST 2006 – the ACM Symposium on User Interface Software and Technology*. p. 225-234.
- C49. Daniel Wigdor, Darren Leigh, Clifton Forlines, Samuel Shipman, John Barnwell, Ravin Balakrishnan, Chia Shen. (2006). Under the table interaction. *Proceedings of UIST 2006 – the ACM Symposium on User Interface Software and Technology*. p. 259-268
- C50. Anastasia Bezerianos, Pierre Dragicevic, Ravin Balakrishnan. (2006). Mnemonic rendering: An image-based approach for exposing hidden changes in dynamic displays. *Proceedings of UIST 2006 – the ACM Symposium on User Interface Software and Technology*. p. 159-168. [**ACM UIST 2006 Best Student Paper Award, and one of 3 papers invited to a UIST reprise session at ACM SIGGRAPH 2007**]
- C51. Tovi Grossman, Ravin Balakrishnan. (2006). The design and evaluation of selection techniques for 3d volumetric displays. *Proceedings of UIST 2006 – the ACM Symposium on User Interface Software and Technology*. p. 3-12.
- C52. Clifton Forlines, Daniel Vogel, Ravin Balakrishnan. (2006). HybridPointing: Fluid switching between absolute and relative pointing with a direct input device. *Proceedings of UIST 2006 – the ACM Symposium on User Interface Software and Technology*. p. 211-220.

- C53. Tovi Grossman, Ravin Balakrishnan. (2006). An evaluation of depth perception on volumetric displays. *Proceedings of AVI 2006 – the Conference on Advanced Visual Interfaces*. p. 193-200.
- C54. Anand Agarawala, Ravin Balakrishnan. (2006). Keepin' it real: Pushing the desktop metaphor with physics, piles and the pen. *Proceedings of CHI 2006 – the ACM Conference on Human Factors in Computing Systems*. p. 1283-1292.
- C55. Daniel Wigdor, Chia Shen, Clifton Forlines, Ravin Balakrishnan. (2006). Effects of display position and control space orientation on user preference and performance. *Proceedings of CHI 2006 – the ACM Conference on Human Factors in Computing Systems*. p. 309-318.
- C56. Tovi Grossman, Ken Hinckley, Patrick Baudisch, Maneesh Agrawala, Ravin Balakrishnan. (2006). Hover widgets: Using the tracking state to extend the capabilities of pen-operated devices. *Proceedings of CHI 2006 – the ACM Conference on Human Factors in Computing Systems*. p. 861-870.
- C57. Abhishek Ranjan, Ravin Balakrishnan, Mark Chignell. (2006). Searching in audio: The utility of transcripts, dichotic presentation, and time-compression. *Proceedings of CHI 2006 – the ACM Conference on Human Factors in Computing Systems*. p. 721-730.
- C58. Michael Wu, Chia Shen, Kathy Ryall, Clifton Forlines, Ravin Balakrishnan. (2006). Gesture registration, relaxation, and reuse for multi-point direct-touch surfaces. *Proceedings of TableTop 2006 – The IEEE International Workshop on Horizontal Interactive Human Computer Systems*. p. 183-190.
- C59. Daniel Vogel, Ravin Balakrishnan. (2005). Distant freehand pointing and clicking on very large high resolution displays. *Proceedings of UIST 2005 – the ACM Symposium on User Interface Software and Technology*. p. 33-42.
- C60. Shahzad Malik, Abhishek Ranjan, Ravin Balakrishnan. (2005). Interacting with large displays from a distance with vision-tracked multi-finger gestural input. *Proceedings of UIST 2005 – the ACM Symposium on User Interface Software and Technology*. p. 43-52. **[One of 3 papers invited to a UIST reprise session at ACM SIGGRAPH 2006]**
- C61. Gonzalo Ramos, Ravin Balakrishnan. (2005). Zliding: Fluid zooming and sliding for high precision parameter manipulation. *Proceedings of UIST 2005 – the ACM Symposium on User Interface Software and Technology*. p. 143-152.
- C62. Clifton Forlines, Ravin Balakrishnan, Paul Beardsley, Jeroen van Baar, Ramesh Raskar. (2005). Zoom-and-Pick: Facilitating visual zooming and precision pointing with interactive handheld projectors. *Proceedings of UIST 2005 – the ACM Symposium on User Interface Software and Technology*. p. 73-82.
- C63. Michael McGuffin, Ravin Balakrishnan. (2005). Interactive visualization of genealogical graphs. *Proceedings of InfoVis 2005 – the IEEE Symposium on Information Visualization*. p. 17-24.
- C64. Theophanis Tsandilas, Ravin Balakrishnan. (2005). An evaluation of techniques for reducing spatial interference in single display groupware. *Proceedings of ECSCW 2005 – the European Conference on Computer Supported Cooperative Work*. p. 221-240.
- C65. Daniel Wigdor, Ravin Balakrishnan. (2005). Empirical investigation into the effect of orientation on text readability in tabletop displays. *Proceedings of ECSCW 2005 – the European Conference on Computer Supported Cooperative Work*. p. 205-224.
- C66. Xiang Cao, Ravin Balakrishnan. (2005). Evaluation of an online adaptive gesture interface with command prediction. *Proceedings of GI 2005 – the Graphics Interface Conference*. p. 187-194. **[GI 2005 Best Student Paper Award]**
- C67. Tovi Grossman, Ravin Balakrishnan. (2005). The Bubble Cursor: Enhancing target acquisition by dynamic resizing of the cursor's activation area. *Proceedings of CHI 2005 – the ACM Conference on Human Factors in Computing Systems*. p. 281-290. **[ACM CHI 2005 Best Paper Award]**

- C68. Anastasia Bezerianos, Ravin Balakrishnan. (2005). The Vacuum: Facilitating the manipulation of distant objects. *Proceedings of CHI 2005 – the ACM Conference on Human Factors in Computing Systems*. p. 361-370.
- C69. Daniel Vogel, Ravin Balakrishnan. (2004). Interactive public ambient displays: transitioning from implicit to explicit, public to personal, interaction with multiple users. *Proceedings of UIST 2004 – the ACM Symposium on User Interface Software and Technology*. p. 137-146.
- C70. Shengdong Zhao, Ravin Balakrishnan. (2004). Simple vs. compound mark hierarchical marking menus. *Proceedings of UIST 2004 – the ACM Symposium on User Interface Software and Technology*. p. 33-42.
- C71. Tovi Grossman, Daniel Wigdor, Ravin Balakrishnan. (2004). Multi-finger gestural interaction with 3D volumetric displays. *Proceedings of UIST 2004 – the ACM Symposium on User Interface Software and Technology*. p. 61-70. **[ACM UIST 2004 Best Paper Award, and one of 3 papers invited to a UIST reprise session at ACM SIGGRAPH 2005]**.
- C72. Karan Singh, Ravin Balakrishnan. (2004). Visualizing 3D scenes using non-linear projections and data mining of previous camera movements. *Proceedings of Afrigraph 2004 – the ACM African Graphics Conference*. p. 41-48.
- C73. Michael McGuffin, Gord Davison, Ravin Balakrishnan. (2004). Expand-ahead: A space-filling strategy for browsing trees affording faster drill-down. *Proceedings of InfoVis 2004 – the IEEE Symposium on Information Visualization*. p. 119-126.
- C74. Wael Aboelsaadat, Ravin Balakrishnan. (2004). An empirical comparison of transparency on one and two layer displays. *Proceedings of HCI 2004 – the British HCI Conference*. p. 53-67.
- C75. Steven Tsang, Ravin Balakrishnan, Karan Singh, Abhishek Ranjan. (2004). A suggestive interface for image guided 3D sketching. *Proceedings of CHI 2004 – the ACM Conference on Human Factors in Computing Systems*. p. 591-598.
- C76. Gonzalo Ramos, Matthew Boulos, Ravin Balakrishnan. (2004). Pressure widgets. *Proceedings of CHI 2004 – the ACM Conference on Human Factors in Computing Systems*. p. 487-494.
- C77. Tovi Grossman, Ravin Balakrishnan. (2004). Pointing at trivariate targets in 3D environments. *Proceedings of CHI 2004 – the ACM Conference on Human Factors in Computing Systems*. p. 447-454.
- C78. Daniel Wigdor, Ravin Balakrishnan. (2004). A comparison of consecutive and concurrent input text entry techniques for mobile phones. *Proceedings of CHI 2004 – the ACM Conference on Human Factors in Computing Systems*. p. 81-88.
- C79. Michael Wu, Ravin Balakrishnan. (2003). Multi-finger and whole hand gestural interaction techniques for multi-user tabletop displays. *Proceedings of UIST 2003 – the ACM Symposium on User Interface Software and Technology*. p. 193-202.
- C80. Daniel Wigdor, Ravin Balakrishnan. (2003). TiltText: Using tilt for text input to mobile phones. *Proceedings of UIST 2003 – the ACM Symposium on User Interface Software and Technology*. p. 81-90.
- C81. Gonzalo Ramos, Ravin Balakrishnan. (2003). Fluid interaction techniques for the control and annotation of digital video. *Proceedings of UIST 2003 – the ACM Symposium on User Interface Software and Technology*. p. 105-114.
- C82. Xiang Cao, Ravin Balakrishnan. (2003). VisionWand: Interaction techniques for large displays using a passive wand tracked in 3D. *Proceedings of UIST 2003 – the ACM Symposium on User Interface Software and Technology*. p. 173-182. **[One of 3 papers invited to a “Best of UIST” reprise session at ACM SIGGRAPH 2004]**
- C83. Michael McGuffin, Liviu Tancau, Ravin Balakrishnan. (2003). Using deformations for browsing volumetric data. *Proceedings of Vis 2003 – the IEEE Visualization Conference*. p. 401-408.
- C84. Tovi Grossman, Ravin Balakrishnan, Karan Singh. (2003). An interface for creating and manipulating curves using a high degree-of-freedom input device. *Proceedings of CHI 2003 – the ACM Conference on Human Factors in Computing Systems*. p. 185-192.

- C85. Nicholas Burtnyk, Azam Khan, George W. Fitzmaurice, Ravin Balakrishnan, Gordon Kurtenbach. (2002). StyleCam: Interactive stylized 3D navigation using integrated spatial & temporal controls. *Proceedings of UIST 2002 – the ACM Symposium on User Interface Software & Technology*. p. 101-110.
- C86. Michael McGuffin, Ravin Balakrishnan. (2002). Acquisition of expanding targets. *Proceedings of CHI 2002 – the ACM Conference on Human Factors in Computing Systems*. p. 57-64.
- C87. Tovi Grossman, Ravin Balakrishnan, Gordon Kurtenbach, George W. Fitzmaurice, Azam Khan, William Buxton. (2002). Creating principal 3D curves with digital tape drawing. *Proceedings of CHI 2002 – the ACM Conference on Human Factors in Computing Systems*. p. 121-128.
- C88. Tovi Grossman, Ravin Balakrishnan, Gordon Kurtenbach, George W. Fitzmaurice, Azam Khan, William Buxton. (2001). Interaction techniques for 3D modeling on large displays. *Proceedings of I3D 2001 – the ACM Symposium on Interactive 3D Graphics*. p. 17-23.
- C89. Ravin Balakrishnan, Ken Hinckley. (2000). Symmetric bimanual interaction. *Proceedings of CHI 2000 – the ACM Conference on Human Factors in Computing Systems*. p. 33-40.
- C90. Ravin Balakrishnan, Ken Hinckley. (1999). The role of kinesthetic reference frames in two-handed input performance. *Proceedings of UIST 1999 – the ACM Symposium on User Interface Software & Technology*. p. 171-178.
- C91. Ravin Balakrishnan, George W. Fitzmaurice, Gordon Kurtenbach, William Buxton. (1999). Digital tape drawing. *Proceedings of UIST 1999 – the ACM Symposium on User Interface Software & Technology*. p. 161-169.
- C92. Ravin Balakrishnan, Gordon Kurtenbach. (1999). Exploring bimanual camera control and object manipulation in 3D graphics interfaces. *Proceedings of CHI 1999 – the ACM Conference on Human Factors in Computing Systems*. p. 53-63.
- C93. George W. Fitzmaurice, Ravin Balakrishnan, Gordon Kurtenbach, William Buxton. (1999). An exploration into supporting artwork orientation in the user interface. *Proceedings of CHI 1999 – the ACM Conference on Human Factors in Computing Systems*. p. 167-174.
- C94. Ravin Balakrishnan, George W. Fitzmaurice, Gordon Kurtenbach, Karan Singh. (1999). Exploring interactive curve and surface manipulation using a bend and twist sensitive input strip. *Proceedings of I3D 1999 – the ACM Symposium on Interactive 3D Graphics*. p. 111-118.
- C95. Ravin Balakrishnan, Pranay Patel. (1998). The PadMouse: Facilitating selection and spatial positioning for the non-dominant hand. *Proceedings of CHI 1998 – the ACM Conference on Human Factors in Computing Systems*. p. 9-16.
- C96. Ravin Balakrishnan, Thomas Baudel, Gordon Kurtenbach, George W. Fitzmaurice. (1997). The Rockin'Mouse: Integral 3D manipulation on a plane. *Proceedings of CHI 1997 – the ACM Conference on Human Factors in Computing Systems*. p. 311-318.
- C97. Ravin Balakrishnan, I. Scott MacKenzie. (1997). Performance differences in the fingers, wrist, and forearm in computer input control. *Proceedings of CHI 1997 – the ACM Conference on Human Factors in Computing Systems*. p. 303-310.
- C98. Colin Ware, Ravin Balakrishnan. (1994). Target acquisition in fishtank VR: The effects of lag and frame rate. *Proceedings of the Graphics Interface Conference*. p. 1-7.

Refereed conference notes and short papers

- N1. Gerry Chu, Tomer Moscovich, Ravin Balakrishnan. (2009). Haptic conviction widgets. *Proceedings of GI 2009 – the Graphics Interface Conference*. p. 207-210.
- N2. Daniel Wigdor, Chia Shen, Clifton Forlines, Ravin Balakrishnan. (2006). Table-centric interactive spaces for real-time collaboration. *Proceedings of AVI 2006 – the Conference on Advanced Visual Interfaces*. p. 103-107.
- N3. Michael Tsang, Nigel Morris, Ravin Balakrishnan. (2004). Temporal thumbnails: rapid visualization of time-based viewing data. *Proceedings of AVI 2004 – the Conference on Advanced Visual Interfaces*. p. 175-178.

Conference abstracts, posters and demos

1. Jeremy Birnholtz, Abhishek Ranjan, Ravin Balakrishnan. (2008). Error and coupling: Extending common ground to improve the provision of visual information for collaborative tasks. *Conference of the International Communication Association, Montreal, Canada, May 22-26, 2008.*
2. Jeremy Birnholtz, Abhishek Ranjan, Ravin Balakrishnan. (2007). Using motion tracking data to augment video recordings in experimental social science research. *Proceedings of the Third International Conference on e-Social Science.*
3. Igor Mordatch, Patrick Coleman, Karan Singh, Ravin Balakrishnan. (2007). Interface techniques for 3D control of spatial keyframing. *Poster in ACM SIGGRAPH Conference.*
4. Daniel Wigdor, Chia Shen, Clifton Forlines, Ravin Balakrishnan. (2006). Table-centric interactive spaces for real-time collaboration: a video demonstration. *Video Proceedings of CSCW 2006 – the ACM Conference on Computer Supported Cooperative Work.*
5. Daniel Wigdor, Chia Shen, Clifton Forlines, Ravin Balakrishnan. (2006). Table-centric interactive spaces for real-time collaboration: Solutions, evaluation, and application scenarios. *Proceedings of CollabTech 2006.*
6. Ravin Balakrishnan, Colin Ware, Tim Smith. (1994). Virtual handtool with force-feedback. *Companion Proceedings of CHI 1994 – the ACM Conference on Human Factors in Computing Systems.* p. 83-84.

Technical Reports

1. Gonzalo Ramos, Ravin Balakrishnan. (2004). Visual features and interference in pressure widgets. Technical Report, DGP Lab, University of Toronto, DGP-TR-2004-003.
2. Anastasia Bezerianos, Ravin Balakrishnan. (2004). Interaction and visualization techniques for very large scale high resolution displays. Technical Report, DGP Lab, University of Toronto, DGP-TR-2004-002.

Theses

1. Ravin Balakrishnan. (2001). Issues in bimanual interaction for computer graphics. Ph.D. Thesis, Department of Computer Science, University of Toronto. February 2001.
2. Ravin Balakrishnan. (1997). The evolution and evaluation of a 3D input device. M.Sc. Thesis, Department of Computer Science, University of Toronto. January 1997.

Patents

Issued

1. Clifton Forlines, Ravin Balakrishnan. (2009). Method for stabilizing and precisely locating pointers generated by handheld direct pointing devices. *United States Patent #7486274.*
2. Ravin Balakrishnan, George Fitzmaurice, Gordon Kurtenbach. (2008). Techniques for pointing to locations within a volumetric display. *United States Patent # 7324085*
3. Ravin Balakrishnan, George Fitzmaurice, Gordon Kurtenbach, Karan Singh. (2008). System for creating and modifying curves and surfaces. *United States Patent #7289121*
4. George Fitzmaurice, Ravin Balakrishnan, Gordon Kurtenbach. (2007). Graphical user interface widgets viewable and readable from multiple viewpoints in a volumetric display. *United States Patent #7205991*
5. Ravin Balakrishnan, Gordon Kurtenbach, George Fitzmaurice. (2006). System for physical rotation of volumetric display enclosures to facilitate viewing. *United States Patent #7138997*
6. Ravin Balakrishnan, Gordon Kurtenbach. (2005). A system for dynamically mapping input device movement as a user's viewpoint changes. *United States Patent # 6981229.*

7. Gordon Kurtenbach, George Fitzmaurice, Ravin Balakrishnan. (2004). Three dimensional volumetric display input and output configurations. *United States Patent #6753847*.
8. Ravin Balakrishnan, William Buxton, George W. Fitzmaurice, Gordon Kurtenbach. (2003). Digital tape drawing system. *United States Patent #6642927*.
9. Ravin Balakrishnan, Thomas Baudel, George W. Fitzmaurice, Gordon Kurtenbach. (2000). Three-dimensional input system using tilt. *United States Patent #6115028*.

Filed

1. James Scott, Shahram Izadi, Nicolas Villar, Ravin Balakrishnan. (pending). Assisting input from a keyboard. *Patent pending, filed 2010*.
2. Saleema Amershi, Neema Moraveji, Meredith Morris, Ravin Balakrishnan. (pending). Multiple mouse character entry. *Patent pending, filed 2009*.
3. Hrvoje Benko, Andrew Wilson, Ravin Balakrishnan. (pending). Touch sensing for curved displays. *Patent pending, filed 2008*.
4. Kentaro Toyama, Gerald Chu, Ravin Balakrishnan. (pending). Talking paper authoring tools. *Patent pending, filed 2008*.
5. Desney Tan, Daniel Morris, Scott Saponas, Ravin Balakrishnan. (pending). Recognizing gestures from forearm EMG signals. *Patent pending, filed 2008*.
6. Anand Agarawala, Ravin Balakrishnan. (pending). Method, system, and computer program product for organizing and visualizing display objects. *Patent pending, filed 2007*.
7. Clifton Forlines, Ravin Balakrishnan. (pending). Method and system for switching between absolute and relative pointing with direct input devices. *Patent pending, filed 2007*.
8. Steven Tsang, Karan Singh, Abhishek Ranjan, Ravin Balakrishnan. (pending). Method, system and computer program for using a suggestive modeling interface. *Patent pending, filed 2006*.
9. Gordon Kurtenbach, George Fitzmaurice, Ravin Balakrishnan. (pending). Volume management system for volumetric display. *Patent pending, filed 2002*.
10. George Fitzmaurice, Ravin Balakrishnan, Gordon Kurtenbach. (pending). Widgets displayed and operable on a surface of a volumetric display enclosure. *Patent pending, filed 2002*.
11. Nicolas Burtnyk, Azam Khan, George W. Fitzmaurice, Ravin Balakrishnan, Gordon Kurtenbach. (pending). A System And Method Of Integrated Spatial And Temporal Navigation. *Patent pending, filed 2002*.

Invited talks

“Facile interaction with displays all over the place”. Invited lecture. Department of Computer Science, UOIT. Host: Dr. Faisal Qureshi. 26 Jan 2011.

“Facile interaction with displays all over the place”. Invited lecture. Department of Computer Science, Queens University. Host: Dr. Roel Vertegaal. 19 Jan 2010.

“Facile interaction with displays all over the place”. Colloquim. Department of Computer Science, Harvard University. Host: Dr. Chia Shen. 5 Mar 2009.

“Facile interaction with displays all over the place”. HP Labs India Lecture Series. Bangalore, India. 17 Feb 2009.

“Interacting with displays all over the place.” Invited talk at the UK-India Winter School on HCI. Bangalore, India. Host: Sriram Subramanian. 3 Feb 2009.

“Interacting with displays all over the place.” Invited talk at the McGill University CRMMRT Workshop on Multimodal Interaction. Host: Dr. Jeremy Cooperstock. 26 Sep 2008.

“Interacting with displays all over the place.” Invited talk at the iCORE Banff Informatics Summit. Host: Dr. Saul Greenberg and Dr. Sheelagh Carpendale. 22 Aug 2008.

“Towards more casual and realistic user interfaces.” Invited talk at HP Labs, Bangalore, India. Host: Dr. Sriganesh Madvanath. 20 Feb 2008.

“Towards more casual and realistic user interfaces.” Keynote talk at TECS Week, Pune, India. Host: Dr. Harrick Vin. 10 Jan 2008.

“Towards more casual and realistic user interfaces/” Keynote talk at Conference on Human-Machine Environments, Jinan, Shangdong Province, China. Host: Dr. Yuanchun Shi. 15 Oct 2008.

“Towards more casual ubiquitous interfaces.” Invited talk at Microsoft Research India, Bangalore. Host: Dr. Kentaro Toyama. 12 June 2007.

“Physics, projection, piles, and pens: user interfaces in the post GUI era.” Invited talk at Institute of Software, Chinese Academy of Sciences, Beijing. Host: Dr. Guozhong Dai. 5 Sep 2006.

“Physics, projection, piles, and pens: user interfaces in the post GUI era.” Invited talk at Tsinghua University, Beijing. Host: Dr. Yuanchun Shi. 1 Sept 2006.

“Physics, projection, piles, and pens: user interfaces in the post GUI era.” Invited talk at Microsoft Research Asia, Beijing. Host: Dr. Jian Wang. 30 Aug 2006.

“UI Projects at DGP lab”. Informal talk at Microsoft Research Cambridge. Host: Dr. Abigail Sellen. 12 July 2006.

“Physics, projection, piles, and pens: user interfaces in the post GUI era.” Invited talk at the University of Lille, France. Host: Prof. Gery Casiez. 10 July 2006.

“Physics, projection, piles, and pens: user interfaces in the post GUI era.” Invited talk at the iLog, France. Host: Dr. Thomas Baudel. 6 July 2006.

“Physics, projection, piles, and pens: user interfaces in the post GUI era.” Invited talk at LRI, University of Paris-Sud, France. Host: Prof. Michel Beaudouin-Lafon. 20 June 2006.

“Why aren’t we using 3D interfaces, and will we ever?” Keynote lecture, IEEE Symposium on 3D User Interfaces, 26 March 2006.

“Interaction and Visualization Techniques for Next-Generation Displays.” HCIL Colloquium, Department of Computer Science, University of Maryland, College Park. Host: Prof. Ben Bederson. 15 March 2005.

“Interaction Design for Future Computing Environments.” Colloquium, Department of Computer Science, University of Washington. Host: Prof. James Landay. 1 March 2005.

“Interaction and Visualization Techniques for Next-Generation Displays”. Distinguished Lecture, Department of Electrical Engineering and Computer Science, University of California, Berkeley. Host: Prof. John Canny. 17 Nov 2004.

“Usability challenges of large scale off-the-desktop interaction”. Invited talk at the IBM MITE Conference, Toronto, Canada. 4 Oct 2004.

“High degree-of-freedom interfaces”. Invited talk at the TTI/Vanguard Technology Transfer Symposium. Phoenix, Arizona: 3-4 Dec 2003.

“Non-wimp user interfaces”. Invited talk at IBM Centre for Advanced Studies. Host: Dr. Paul Smith. 26 Aug 2003.

“Fluid interaction techniques for the control and annotation of digital video”. Invited talk at Nokia Research Centre, Helsinki, Finland. Host: Miika Silfverberg. 9 May 2003.

“Interaction techniques for tabletop and volumetric displays”. Invited talk at Swedish National Defence College, Stockholm, Sweden. Host: S. Anders Christensson. 8 May 2003.

“Interaction with high degree-of-freedom input and next generation display technologies”. Invited lectures spanning 2 days at the University of Tampere, Tampere, Finland. Host: Prof. Kari-Jouko Rähkä. 5-6 May 2003.

“High degree-of-freedom interaction and visualization”. Presentation at an invitation-only workshop at the Banff Centre for the Arts, Banff, Alberta. Host: Sara Diamond. 12-15 Sep 2002.

“Multi-channel and multi degree-of-freedom interaction for computer graphics”. Invited talk at National Research Council, Ottawa. Host: Dr. Janice Singer. 20 Feb 2002.

"Devices and Interaction Techniques for Interfaces to 3D Graphics". Invited talk at University Telekom, Melaka, Malaysia. Host: Dr. Abu Hasan Ismail, Dean. Dec 1998.

"Multi Stream and Multi Degree of Freedom Input for Desktop 3D Interaction". Invited talk at Microsoft Research. Host: Dr. Ken Hinckley. 15 Oct 1998.

"Overview of Alias|wavefront User Interface Research Group's research projects". Presentation at Toron-Nihon Workshop organized by Dr. Paul Milgram at the University of Toronto. 19 Mar 1998.

Teaching

Graduate courses taught as a faculty member

CSC2524, “Topics in Interactive Computing”, Sep - Dec 2010.

A research seminar in human-computer interaction. This year, the focus was on next generation user interfaces.

CSC2524, “Topics in Interactive Computing”, Sep - Dec 2006.

A research seminar in human-computer interaction. This year, the focus was on advanced “off-the-desktop” interfaces.

CSC2524, “Topics in Interactive Computing”, Jan - Apr 2006.

A research seminar in human-computer interaction. This year, the focus was on interactive information visualization.

CSC2524, “Topics in Interactive Computing”, Sep - Dec 2004.

A research seminar in human-computer interaction. This year, the focus was on audio and gesture based user interfaces and interaction techniques.

CSC2514, “Human-Computer Interaction”, Sep - Dec 2004.

This is the same course as CSC428 (the second undergraduate course on Human-Computer Interaction). The graduate students taking the course were required to do a more substantial research paper.

CSC2524, “Topics in Interactive Computing”, Sep - Dec 2003

A research seminar in human-computer interaction. This year, the focus was on sketch and gesture based user interfaces and interaction techniques.

CSC2514, “Human-Computer Interaction”, Sep - Dec 2003.

CSC2524, “Topics in Interactive Computing”, Sep - Dec 2002

A research seminar in human-computer interaction. This year, the focus was large and tabletop display user interfaces and interaction techniques.

CSC2514, “Human-Computer Interaction”, Sep - Dec 2002.

CSC2514, “Human-Computer Interaction”, Sep - Dec 2001

Undergraduate courses taught as a faculty member

CSC490, “Capstone Design Project”, Sep - Dec 2006.

CSC490, “Capstone Design Project”, Sep 2005 - Apr 2006.

CSC490, “Capstone Design Project”, Sep 2004 - Apr 2005.

4th year undergraduate course. This is a new course I proposed and developed last year that has students working on substantial projects spanning several areas of computer science.

CSC428, “Human-Computer Interaction”, Sep - Dec 2004

4th year undergraduate course. This second Human-Computer Interaction course at Toronto builds on the department's first course in HCI, CSC318. While the focus in CSC318 is largely on the design process, this

second course focuses more on the underlying models of human-computer interaction, rigorous formal evaluation techniques, and research frontiers

CSC490, "Capstone Design Project", Sep 2003 - Apr 2004.

CSC428, "Human-Computer Interaction", Sep - Dec 2003

CSC428, "Human-Computer Interaction", Sep - Dec 2002

CSC318, "The Design of Interactive Computational Media", Jan - Apr 2002

3rd year undergraduate course on methodologies for designing and evaluating user interfaces. The first course on Human-Computer Interaction at the University of Toronto.

CSC428, "Human-Computer Interaction", Sep - Dec 2001

Undergraduate courses taught while I was a graduate student

CSC258, "Computer Organization", May - Aug 2000.

2nd year undergraduate course on digital logic design, machine languages, and computer system organization fundamentals.

CSC258, "Computer Organization", Jan - Apr 2000.

CSC258, "Computer Organization", Sep - Dec 1999.

CSC108, "Introduction to Computer Programming", May - Aug 1999.

1st programming course for computer science undergraduates, taking an object-oriented approach using Java.

CSC258, "Computer Organization", Jan - Apr 1999.

CSC340, "Information Systems Analysis and Design", Sep - Dec 1998.

3rd year undergraduate course on theory, tools, and techniques for information systems analysis and design.

CSC258, "Computer Organization", May - Aug 1998.

CSC340, "Information Systems Analysis and Design", Sep - Dec 1997.

CSC104, "The How and Why of Computing", Jan - Apr 1997.

1st year undergraduate course in computing for non computer science students.

CSC258, "Computer Organization", May - Aug 1995.

Teaching assistantships while I was a graduate student

CSC428, "Human Computer Interaction", Sep - Dec 1996.

CSC228, "File Structures and Data Management", Sep - Dec 1995, Jan - Apr 1995.

CSC258, "Computer Organization", Jan - Apr 1996, Sep - Dec 1994, May - Aug 1994, Jan - Apr 1994, Sep - Dec 1993.

Academic advising

Current postdoctoral fellows

Thomas Pietrzak, Jan 2011 – ongoing, sole advisor

William Soukoreff, May 2010 - ongoing, sole advisor

Current Ph.D. students

Xiaojun Bi, Sep 2006 - ongoing, sole advisor

Dustin Freeman, Sep 2010 - ongoing, sole advisor

Julian Lepinski, Sep 2009 – ongoing, sole advisor.

Jian Zhao, Sep 2009 – ongoing, sole advisor.

Current masters students

(note: the Master's degree at Toronto is a research degree requiring a thesis or paper describing original research)

Jonathan Deber, Sep 2006 – ongoing (part time), sole advisor

Aakar Gupta, Sep 2010 – ongoing, sole advisor.

Rorik Henrikson, Sep 2010 – ongoing, sole advisor.

Navkar Samdaria, Sep 2010 – ongoing, sole advisor.

Former postdoctoral fellows

Seok-Hyung Bae, Sept 2007 – Feb 2010, co-advised with Karan Singh.

Tomer Moscovich, Feb 2007 – June 2008.

Jeremy Birnholtz, Sep 2005 – July 2007, co-advised with Ron Baecker, Saul Greenberg, Carl Gutwin.

Géry Casiez, Feb - Aug 2005

Pierre Dragicevic, Feb 2006 – Apr 2007.

Graduated Ph.D. students

Daniel Vogel. Graduated April 2010, sole advisor

Thesis: “Direct pen input and hand occlusion”

Clifton Forlines. Graduated Nov 2008, sole advisor

Thesis: “User interfaces for visual search”

Abhishek Ranjan. Graduated Oct 2008, sole advisor

Thesis: “Automatic camera control for capturing collaborative meetings”

Xiang Cao. Graduated Oct 2008, sole advisor

Thesis: “Handheld projector interaction”

Tovi Grossman. Graduated Apr 2008, sole advisor

Thesis: “Interaction with volumetric displays”

Daniel Wigdor. Graduated Apr 2008, sole advisor

Thesis: “The design of table-centric interactive spaces”

Gonzalo Ramos. Graduated Jan 2008, sole advisor

Thesis: “Pressure sensitive pen interactions”

Anastasia Bezerianos. Graduated Sept 2007, sole advisor

Thesis: “Designs for single user, up-close interaction with wall-sized displays”

Michael McGuffin. Graduated May 2007, sole advisor

Thesis: “An investigation of issues and techniques in highly interactive computational visualization”

Graduated masters students

(note: prior to 2007, the master's degree at Toronto required a formal thesis; since 2007, the thesis is optional and a research paper can be submitted instead).

Mohit Jain. Graduated Jan 2011, sole advisor

Research paper: “An exploratory study of mobile collaborative learning in developing regions”.

Akhil Mathur. Graduated Jan 2011, sole advisor
 Research paper: “An exploratory study of a cameraphone-projector system”.

Dustin Freeman. Graduated Sep 2010, sole advisor.
 Research paper: “Tangible Actions: More efficient direct multitouch through replaying gestures”.

Dominika Ruzzkowski. Graduated Sep 2010, sole advisor.
 Research paper: “Exploring user adaptability of mouse and touch in the desktop environment”.

Patrick Dubroy. Graduated May 2009, sole advisor
 Research paper: “A field study on the use of tabs in Mozilla Firefox”.

Azam Khan. Graduated Sep 2008, sole advisor
 Research paper: “ViewCube: A 3D orientation indicator and controller”.

Michael Jurka. Graduated Jan 2008, sole advisor
 Research paper: “Visualizing user activity to enhance document retrieval”.

Gerald Chu. Graduated Dec 2007, sole advisor
 Research paper: “Haptic conviction widgets”

Tristan Campbell. Graduated Oct 2006, sole advisor
 Thesis: “MCurve: A crossing based system for graphical music composition”

Steven Tsang. Graduated Aug 2006, co-advised with Karan Singh.
 Thesis: “A sketch based 2D animation system using dynamic motion hierarchies”

Anand Agarawala. Graduated Jan 2006, sole advisor
 Thesis: “Pushing the desktop metaphor with physics, piles and the pen”

Daniel Vogel. Graduated Jan 2005, sole advisor
 Thesis: “Interactive public ambient displays”

Jia Sheng, Graduated Jan 2005, co-advised with Karan Singh.
 Thesis: “A gestural 3D modeling interface using fingers and a physical prop tracked in 3D”

Abhishek Ranjan. Graduated Jan 2005, sole advisor
 Thesis: “Browsing archived meeting audio and time-synchronized data”

Wael Aboelsaadat. Graduated Jan 2004, sole advisor
 Thesis: “Evaluation of a transparent two-layer display”

Xiang Cao. Graduated Jan 2004. co-advised with Allan Jepson.
 Thesis: “An exploration of gesture-based interaction”

Tovi Grossman. Graduated Jan 2004, sole advisor
 Thesis: “Alternate user interfaces for the manipulation of curves in 3D environments”

Daniel Wigdor. Graduated Jan 2004, sole advisor
 Thesis: “Chording and tilting for rapid, unambiguous text entry to mobile phones”

Yan (Grace) Wang. Graduated Dec 2003, sole advisor
 Thesis: “Selection techniques for laser pointer interaction”

Michael McGuffin. Graduated Aug 2002, co-advised with Gordon Kurtenbach
 Thesis: “Fitts’ law and expanding targets: an experimental study, and applications to user interface design”

Ph.D. thesis committees

William Soukoreff. 2010. York University. Ph.D. Thesis External Examiner.
 Advisor: Scott MacKenzie.

Craig Tashman, 2009 – present. GVVU Centre, Georgia Tech. Ph.D. Thesis committee member.
 Advisor: Keith Edwards.

Regis Kopper. 2008 - present. Department of Computer Science, Virginia Tech. Ph.D. Thesis committee member. Advisor: Doug Bowman.

Michael Daum. 2006 – present. Department of Computer Science, University of Toronto. Ph.D. Thesis committee member. Advisor: Karan Singh.

David Dearman. 2006 – present. Department of Computer Science, University of Toronto. Ph.D. Thesis committee member. Advisor: Khai Truong.

Bowen Hui. 2003 – present. Department of Computer Science, University of Toronto. Ph.D. Thesis committee member. Advisor: Craig Boutilier

Shahzad Malik. 2005 – 2007. Department of Computer Science, University of Toronto. Ph.D. Thesis committee member. Advisor: Allan Jepson.

Iqbal Mohamed. 2005 – 2008. Department of Computer Science, University of Toronto. Ph.D. Thesis committee member. Advisor: Eyal de Lara.

Tao Ni. 2006 - present. Department of Computer Science, Virginia Tech. Ph.D. Thesis committee member. Advisor: Doug Bowman.

Koji Yatani. 2006 – present. Department of Computer Science, University of Toronto. Ph.D. Thesis committee member. Advisor: Khai Truong

Shengdong Zhao. 2004 – 2008. Department of Computer Science, University of Toronto. Ph.D. Thesis committee member. Advisor: Mark Chignell.

Maciej Kalisiak. 2002 - 2006. Department of Computer Science. Thesis committee member. Advisor: Michiel van de Panne

Wenbi Wang. 2004. Department of Mechanical and Industrial Engineering. Thesis defense committee member. Advisor: Paul Milgram.

Second reader for masters theses advised by others

Frank Li. 2011. Advisor: Khai Truong

Yannick Thiel. 2011. Advisor: Karan Singh

James McCrae. 2008. Advisor: Karan Singh

Noah Lockwood. 2006. Advisor: Karan Singh

Naiqi Weng. 2005. Advisor: Karan Singh

Krista Strickland. 2005. Advisor: Ron Baecker

Xia Liu. 2004. Advisor: Karan Singh

Iqbal Mohamed. 2004. Advisor: Eyal de Lara

Michael Tsang. 2002. Advisor: Bill Buxton & George Fitzmaurice

Nicolas Burtnyk. 2002. Advisor: Bill Buxton

Undergraduate research students

Curren Pangler, 1 May – 31 Aug 2007 (NSERC USRA award), co-advised with my postdoc Tomer Moscovich.

Sameer Vohra, 1 May – 31 Aug 2007 (NSERC USRA award), co-advised with my postdoc Tomer Moscovich.

Nicholas Kong, 1 May - 31 Aug 2005, 1 May - 31 Aug 2006 (NSERC USRA Award), 1 May – 31 Aug 2007 (NSERC USRA award), co-advised with my PhD student Tovi Grossman.

Matthew Boulos, 1 May - 31 Aug 2003 (NSERC USRA award) and 1 May - 31 Aug 2004 (NSERC USRA award), co-advised with my PhD student Gonzalo Ramos

Vikas Jain, Intern from IIT Bombay, 1 May - 31 July 2003, sole advisor
Tovi Grossman, 1 May - 31 Aug 2002 (NSERC USRA award), sole advisor
Jeffrey Magder, 1 May - 31 Aug 2002 (NSERC USRA award), sole advisor
Abhishek Ranjan, Intern from IIT Bombay, 1 May - 31 July 2002, sole advisor
Plus roughly 20 other undergraduates informally advised on various research activities in my lab.

Undergraduate project course supervision

(these are undergraduate research projects for which the student gets a CSC494/495 course credit or an Engineering Thesis)

Elaine Wong, Sep 2009 – Apr 2010.
Janek Biczysko-Lasocki, Jan – Apr 2007, co-advised with my PhD student Xiang Cao
Jacky Jie Li, Jan – Apr 2007, co-advised with my PhD student Xiang Cao
Phillip Mach, Jan – Apr 2007, co-advised with my PhD student Abhishek Ranjan
Clarence Chan, Jan - Apr 2004, co-advised with my PhD student Daniel Wigdor.
Steve Tsang, Sep - Dec 2002, sole advisor
Jeffrey Magder, Sep - Dec 2002, sole advisor
Daniel Wigdor, Jan - Apr 2002, sole advisor
Simone Maillard, Jan - Apr 2002, sole advisor
Tovi Grossman, Jan - Apr 2002, sole advisor
Wai Shan Lau, Jan - Apr 2002, sole advisor
Casson Ming Tse Lee, Jan - Apr 2002, sole advisor
Tovi Grossman, May - Aug 2000, co-advised with Gordon Kurtenbach.

Service outside the university

Journal, conference and workshop chairing and organization

ACM Transactions on Computer-Human Interaction. Associate Editor, 2010 – present.
IEEE Transactions on Visualization and Computer Graphics. Associate Editor, 2008 – present.
ACM UIST 2009 Symposium on User Interface Software and Technology, Sponsorship Chair.
IEEE 3DUI 2009 Symposium on 3D User Interfaces. Conference Co-Chair.
ACM UIST 2008 Symposium on User Interface Software and Technology, Sponsorship Co-Chair.
Human-Computer Interaction journal. Co-editor of Special Issue on Ubiquitous Multi Display Environments.2007-2008.
ACM UIST 2007 Symposium on User Interface Software and Technology, Program Chair.
ACM UIST 2007 Symposium on User Interface Software and Technology, Sponsorship Co-Chair.
Ubicomp 2005 Workshop on "The Spaces in-between: Seamful vs. Seamless Interactions". Co-organizer.
Graphics Interface 2004 Conference, Conference and Program Co-Chair
Graphics Interface 2002 Conference, Posters and Demonstrations Chair
International Input Research Workshop, Ribeaucourt, France, Apr 2000. Organizing Committee.

Conference and workshop program committees

ACM SIGGRAPH Conference on Computer Graphics and Interactive Techniques (2010).

ACM CHI Conference on Human Factors in Computing Systems, Associate Chair for Papers (2002, 2003, 2004, 2005, 2006, 2009, 2010, 2011).

ACM CHI Conference on Human Factors in Computing Systems, Short Papers Program Committee (2001)

International Projector-Camera Systems Workshop (PROCAMS), Program Committee (2008).

ACM SIGGRAPH International Conference on Virtual-Reality Continuum and its Applications in Industry (VRCAI), Program Committee (2008).

ACM UIST Symposium on User Interface Software and Technology, Papers Committee (2003, 2004, 2005, 2006, 2010). Doctoral symposium committee (2010).

Graphics Interface Conference, Papers Program Committee (2002).

ACM VRST Symposium on Virtual Reality Software and Technology, Full Papers Program Committee (2003).

IUI International Conference on Intelligent User Interfaces, Workshop on Intelligent User Interfaces for Developing Regions, Program Committee (2008).

IEEE InfoVis Symposium on Information Visualization, Papers Program Committee (2006).

ACM I3D Symposium on Interactive 3D Graphics and Games, Papers Program Committee (2006).

NordiCHI Conference, Papers Program Committee (2004).

8th Eurographics Workshop on Virtual Environments, Barcelona, Spain, Papers Program Committee (2002).

5th International Projector-Camera Systems Workshop (PROCAM), Program Committee (2008).

HCI track for CISIS2009, International Conference on Complex, Intelligent and Software Intensive Systems, Fukuoka, Japan. Program Committee (2009).

ACM Dev Conference (2010).

Paper & manuscript refereeing

ACM CHI Conference on Human Factors in Computing Systems (1998, 1999, 2000, 2001, 2007, 2008)

ACM UIST Symposium on User Interface Software and Technology (2001, 2002, 2008, 2009)

ACM SIGGRAPH Conference on Computer Graphics and Interactive Techniques (2001, 2002, 2003, 2004)

ACM I3D Symposium on Interactive 3D Graphics (2001, 2003)

ACM Transactions on Computer Human Interaction (2002, 2004, 2005, 2007, 2008)

ACM Conference on Universal Usability (2000)

ACM Computing Surveys (2008)

Communications of the ACM (1999)

Eurographics Conference (2003, 2004, 2005)

Graphics Interface Conference (1998, 2003, 2005, 2010, 2011)

Human Computer Interaction journal (2005, 2006)

IBM Systems Journal (1997)

IEEE Computer (2004)

IEEE Transactions on Visualization and Computer Graphics (2004, 2005, 2006, 2007)

IEEE Computer Graphics and Applications (2005, 2006)

IEEE InfoVis Symposium on Information Visualization (2005)
Interact Conference (1999, 2000)
Information Visualization journal (2007)
International Journal of Human Computer Studies (2001, 2005, 2006, 2008)
Journal of New Music Research (2003)
MIT Press book review (2005, 2006)
Morgan Kaufmann Press book review (2006).
Ubicomp Conference (2006)
Wiley Press book review (2003)

Grant & fellowship reviewing

Ontario Ministry of Research and Innovation Grant review (2008)
Netherlands Organisation for Scientific Research, grant review (2008).
Austrian Erwin Schroedinger fellowship review (2008).
Swiss National Science Foundation grant reviews (2007)
NSERC New Media Grant review (2004)
NSERC Strategic Grant reviews (2002, 2003, 2004)
NSERC Discovery Grant reviews (2003, 2004, 2005, 2006)
CFI Grant review (2007)

External organizations, tenure and promotion reviews

External reviewer for INRIA's graphics, interaction and visualization research teams (2010).
External reviewer for one tenure case at the University of North Carolina, Charlotte (2010).
External reviewer for one full professor promotion case at York University. (2010)
External reviewer for one tenure case at Harvard University. (2009)
External reviewer for one appointment renewal case at the University of North Carolina, Charlotte. (2008)
External reviewer for one tenure case at the University of California, Berkeley. (2008)
External reviewer for one tenure case at Nanyang Technological University, Singapore. (2007).
External reviewer for one tenure case at the University of Paris-Sud. (2007)

Other activities

ACM UIST 2005 Session Chair
ACM CHI 2002 Conference Session Chair
ACM CHI 2001 Conference Session Chair
Member of Association for Computing Machinery (ACM)

Service within the University of Toronto

PTR Committee., Department of Computer Science, 2010-2011 academic year.
Professional Masters committee, Department of Computer Science, 2009-2010 academic year.

PTR Committee., Department of Computer Science, 2009-2010 academic year.

Committee developing a proposal for a new “EDU-C” unit at the university called the Information and Communications Forum. Led by Prof. Alberto Leon-Garcia. 2008-2009 academic year.

Faculty recruiting committee, Department of Computer Science, 2008-2009 academic year.

Professional Masters committee, Department of Computer Science, 2008-2009 academic year.

Tenure committee for one tenure case at the Department of Mechanical and Industrial Engineering, 2009.

Evaluation committee for one 3rd year faculty review case at the Department of Computer Science, 2008.

Tenure committee for one tenure case at the Department of Computer Science, 2007.

Teaching evaluation committee for one tenure case at the Department of Computer Science, 2007.

Faculty recruiting committee, Department of Computer Science, 2006-2007 academic year.

Initiated and ran a seminar series on research skills and related topics intended for all graduate students in the department. The seminars are archived at: <http://www.dgp.toronto.edu/~rav/gradskillsseminars2007/>

Graduate admissions committee, Department of Computer Science, 2005-2006 academic year.

Faculty recruiting committee for a HCI position, Department of Computer Science, 2004-2005 academic year.

Online graduate applications system: I took the lead on developing this system for the Department of Computer Science, Sept 2004 – May 2006.

Graduate admissions committee, Department of Computer Science, 2004-2005 academic year.

Graduate admissions committee, Department of Computer Science, 2003-2004 academic year.

Graduate breadth evaluation committee, Department of Computer Science, 2003-2004 academic year.

Graduate breadth evaluation committee, Department of Computer Science, 2002-2003 academic year.

Undergraduate committee, Department of Computer Science, 2002-2003 academic year.

Faculty support staff committee, Department of Computer Science, 2002-2003 academic year.

Department computing committee, Department of Computer Science, 2002-2003 academic year.

Faculty recruiting committee, Department of Computer Science, 2002-2003 academic year.

Department of Computer Science “planning discussion paper” committee, responsible for putting together a discussion paper on the direction of the department over the next 5-10 years. Apr-May 2003.

Environment and equity committee, Department of Computer Science, 2001-2002 academic year.

Initiated and organized, together with Kyros Kutulakos, Karan Singh, and Sam Roweis, the first visit of potential graduate students to the department. Feb-Mar 2002. I was also involved in organizing the event the next year (2003).

Initiated and organized a new process for graduate student recruiting where we invite short-listed candidates to visit us for a combined interview/recruitment event, *before* admission offers are made. We have found this to be a very successful process for making more informed admissions decisions. First organized in 2003 for the HCI group, then expanded to Graphics and HCI in 2004, and since then other groups in the department have begun to adopt this approach as well.

From July 2001 to September 2006, I was responsible for the day-to-day direction and management (including supervision of 1 full-time and 1 part-time technical staff members) of the Dynamic Graphics Project laboratory (www.dgp.toronto.edu), which is home base to the department’s graphics and HCI faculty and graduate students (7 faculty, 50 students).

Graphics and HCI seminar coordinator, Department of Computer Science, 2001-2002, 2002-2003, 2003-2004, 2004-2005, 2005-2006 academic years.