

# CHIA SHEN

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## EDUCATION

### ***Ph.D. in Computer Science***

University of Massachusetts, Amherst – 1992

Thesis Title: “*An Integrated Approach to Dynamic Task and Resource Management in Multiprocessor Real-Time Systems*”

### ***M.S. in Computer Science***

University of Massachusetts, Amherst – 1986

Thesis Area: Multi-Access Computer Networks

### ***B.S. in Computer Science***

SUNY Stony Brook – 1983

## EMPLOYMENTS

### **National Science Foundation**

*March 2016 – Present*

Program Director

Division of Research on Learning in Formal and Informal Settings (DRL)

Directorate for Education and Human Resources (EHR)

### **Harvard University**

*2009 - 2016*

Senior Research Fellow, SEAS Harvard University

Director, SDR Lab (<http://sdr.seas.harvard.edu/>)

*June 2008 – July 2009*

Senior Scientist and Program Manager, Initiative in Innovative Computing (IIC), Harvard University

*Jan 2008 – May 2008*

Visiting Senior Scientist, IIC Harvard University

### **Lucid Interactives LLC ([www.lucidinteractives.com](http://www.lucidinteractives.com))**

*2015 - Present*

*Co-Founder & CEO*

### **University of Toronto the School of Graduate Studies**

*2007 – 2010*

Member of the Graduate Faculty (Adjunct)

### **Mitsubishi Electric Research Laboratories (MERL)**

*2003 – 2006*

Associate Director and Senior Research Scientist

*2001 – 2008*

Senior Research Scientist

*1993 – 2000*

Research Scientist

## RESEARCH INTERESTS

Human Computer Interaction (HCI), Visualization, Visual Learning, Future Learning Technologies, Computer Supported Collaborative Learning, Interaction Design.

## AWARDS

- 2015 ACM ITS **10-year Impact Award** for paper on "Gesture Registration, Relaxation, and Reuse for Multi-Point Direct-Touch Surfaces"
- 2015 ACM CHI **Best of CHI Best Paper Award (Top 1%)** on "Fluid Grouping: Quantifying Group Engagement around Interactive Tabletop Exhibits in the Wild".
- 2013 Computer Supported Collaborative Learning **Best Design Paper Award** "Going Deep: Supporting collaborative exploration of evolution in natural history museums"
- 2012 ACM **Recognition of Service Awards**
- 2010 IEEE ifip **Outstanding Contribution Award**
- 2007 ACM **Recognition of Service Awards**
- 2006 Pervasive Gaming Applications **Best Paper Award** "Multimodal Multiplayer Tabletop Gaming"
- 2004 Mitsubishi Electric Corporation "**The Outstanding Contributions to the Development of DiamondTouch Software and Hardware**" Award.

## SELECTED GRANTS

"Life on Earth" (PI)

A National Science Foundation-funded and Harvard lead multi-institutional project

NSF EHR/DRL AISL #1010889 \$2,312,150,

Award period: 09/01/2010 to 01/31/2015

<http://lifeonearth.seas.harvard.edu/>

"The Contribution of Natural History Museums to Science Education" (co-PI)

Multi-institutional Phase I, US and UK Collaborative Planning Project

Collaborative funding: NSF DRL/AISL Science Learning+, US and Wellcome Trust, UK £100,331 [total], £67,698 [From Wellcome]

Award period: 03/01/2015 to 10/31/2015

"Evolution Lab" (PI)

A PBS/WGBH NOVA Digital Lab

Biogen IDEC \$300,000

Award period: 11/03/2014 to 09/19/2015

<http://www.pbs.org/wgbh/nova/labs/lab/evolution/>

"Visualization Groupware and Environment for Collaborative Geospatial Data Exploration, Analysis, and Presentation" (PI)

DoD ARDA(NGA) National Geospatial Intelligence Agency HMI1582-05-1-2005 \$264,000

Award period: 02/2005 to 01/2006

## MEDIA and PRESS

PBS NOVA Engaging Science

<http://www.pbs.org/wgbh/nova/blogs/education/2014/07/life-on-earth-project-turns-evolution-into-a->

gaming-experience/

Biomedical Computation Review “Digging Deep into the Tree of Life”

<http://biomedicalcomputationreview.org/content/digging-deep-tree-life>

Harvard Gazette on Innovation “The Watch Word Is Innovation”

<http://news.harvard.edu/gazette/story/2013/09/the-watchword-is-innovation/>

Science Daily “Teaching tree-thinking through touch”

[www.sciencedaily.com/releases/2012/06/120604111121.htm](http://www.sciencedaily.com/releases/2012/06/120604111121.htm)

Wall Street Journal Business (Health Industry) “Playing on a Tablet as Therapy”

Vector Boston Children’s Hospital’s science and clinical innovation “Kids with cerebral palsy test the latest touchscreen technology”

<http://vectorblog.org/2010/11/kids-with-cerebral-palsy-test-the-latest-touchscreen-technology/>

The National Geographic Explorer: Season 20, Episode 12

Episode “The Science of Surveillance”

<http://channel.nationalgeographic.com/channel/explorer/galleries/episode-science-of-surveillance/at/science-of-surveillance-2-838/>

Computer Power User Magazine Vol. 5 Issue 6) Page(s) 106-107

“Under Development – A Peek at What’s Brewing in the Laboratory”

## PROFESSIONAL ACTIVITIES

*Chair of Steering Committee*      ACM International Conference on Interactive Tabletops and Surfaces (ITS)

*Conference General Chair*      20<sup>th</sup> ACM Symposium on User Interface Software and Technology (UIST)

*Editorial Board*      ACM “Computers in Entertainment”

*Conference and Journal Referee*      ACM CHI, CSCW, UIST  
Computer Graphics and Applications  
IEEE Real Time Systems Symposium  
IEEE Real Time Technology and Applications Symposium  
IEEE Transactions on Computers  
IEEE Transactions on Parallel Distributed Systems  
International Conference on Distributed Computing Systems

*Member*      ACM  
IEEE (Senior Member)  
IEEE Technical Committees

- Real Time Systems (1998)
- Operating Systems and Application Environments (1999)

*Consortium Representative*      ATM Forum, primary representative for Mitsubishi Electric corporation, Principal Member, April 1993 – May 1997

## KEYNOTES & LECTURES

- 2016      Speaker: Stanford BioEngineering Spring Seminar Series, March 28, 2016
- 2015      *Speaker: Gordon Research Conference on Visualization in Science and Education, August 2-7, 2015.*
- 2014      Guest Lecture: CS279 Fall 2014 Topics in Human Computer Interaction Research, SEAS, Harvard University
- 2012      Guest Lecture: CS179 Spring 2012 Design of Interactive Systems, SEAS, Harvard University
- 2011      Invited Speaker: Future of Tabletop Computing, Tsinghua University Beijing China, “*Taming the Technology: Engage them! Communicating Science with Multi-Touch*”
- 2010      China Distinguished HCI Speaker Series & China Symposium on Human Computer Interaction ([http://research.microsoft.com/en-us/events/chinahci2010/speaker\\_series.aspx](http://research.microsoft.com/en-us/events/chinahci2010/speaker_series.aspx))  
“*MultiTouch Coming of Age: Transforming the Way Science Is Experienced*”.  
March 2010.      Beijing, China.
- Keynote: IEEE/IFIP EUC 2010 (International Conferences on Embedded and Ubiquitous Computing. Hong Kong SAR, China, December 11-13, 2010
- Keynote: HHME 2010 (The 6th Joint Conference on Harmonious Human Machine Environment).  
September 23, 2010. Luoyang, China.
- 2009      Keynote: ACM International Conference on Interactive Tabletops and Surfaces
- Keynote: “The Myth of Touch” Invisible Computing: Novel Interfaces to Digital Environments  
EFPL, Lausanne, Switzerland June 4, 2009
- 2007      Keynote: Shareable Interfaces, UK June 19 – 20, 2007
- Keynote: Geodan Day “De kunst van Geo-Innovatie” (The Art of Geo-Innovation), Amsterdam,  
The Netherlands      June 6, 2007
- 2006      Keynote: *First European Conference on Technology Enhanced Learning (October 1-4, 2006)* “*From Clicks to Touches: Enabling Face-to-Face Shared Interface*”
- Tufts University, Computer Science Department 2006 Colloquia  
“*From Clicks to Touches: Enabling Face-to-Face Shared Interface*”
- Stanford University, HCI seminar  
“*A Critical Look at Tabletop Research*”
- 2005      *Understanding Multi-User Interactions on Direct-Touch Surfaces*  
MIT CSAIL, HCI seminar series
- Interactions on Shared Surfaces*

IBM Almaden, HCI seminar

*Understanding Multi-User Interactions on Direct-Touch Surfaces*  
MIT CSAIL, HCI seminar series

2003 *Interactions on Shared Surfaces*  
Stanford University, HCI group

2000 *e-Factory: Dream or Reality, and Where is the Missing Link?*  
Distinguished Lecture Series, Malardalen University (Sweden)

1999 Guest Lecture: Real Time Systems, MIT

*MidART: Middleware Architecture for Distributed Real Time Systems*  
Guilin Institute of Electronic Technology (Guilin, China)

1996 *On ATM Support for Distributed Real Time Applications*  
IEEE Real Time Technology and Applications Symposium, tutorial

## POST-DOCTORAL MENTORING

- Florian Block (SEAS, Harvard University, January 2010 – September 2013)
- Brenda C. Phillips (SEAS, Harvard University, April 1 2011 – March 31, 2012)
- Frederic Venier (MERL, January 1, 2000 – September 2003)

## PHD & MASTER'S COMMITTEE MEMBERSHIP

- Massachusetts Institute of Technology, Media Lab: Daniel Leithinger (Master's Thesis committee, 2012).
- University of Toronto: Daniel Wigdor, (Ph.D. Thesis committee, Defense date: March 2008)
- University of Calgary: Edward Tse, (Ph.D. Thesis committee, Defense date: November 2007)
- Stanford University: Meredith Ringel Morris, (Ph.D. Thesis committee, Defense date: March 2006)
- University of Massachusetts, Amherst: Oscar J. Gonzales, (Ph.D. Thesis committee, Defense date: May 2000)

## GRADUATE STUDENT RESEARCH ADVISING

- Michael Horn (Research intern, 2008 – 2010)
- Bertrand Schneider (Research intern, 2009 – 2010)
- Laurence Muller (Research intern, 2009 – 2010)

## UNDERGRADUATE STUDENT RESEARCH ADVISING

- Larry Kyrala, 2011 (SEAS Faculty Advisor: Hanspeter Pfister)  
Senior thesis: "FloTree: A Visualization of the Tree of Life as a Dynamic Process"
- Chris Chua 2012 (National University of Singapore)  
Senior thesis: FloTreeSim: An interactive simulation system for learning evolution

## PUBLICATIONS

### Book Chapters

"Tabletop Games: Platforms, Experimental Games and Design". Michael Haller, Forlines C, Koeffel C, Leitner J, Shen C. In *Art and Technology of Entertainment Computing and Communication - Advances in Interactive New Media for Entertainment Computing*, Editor: Adrian David Cheok  
ISBN: 978-1-84996-136-3 (Print) 978-1-84996-137-0 (Online) pp 271-297, 2010 Springer London.

“Collaborative Tabletop Research and Evaluation: Interface and Interactions on Direct-Touch Horizontal Surfaces”. Shen, C., Ryall, K., Forlines, C., Esenther, A., Vernier, F.D., Everitt, K., Wu, M., Wigdor, D., Ringel Morris, M., Hancock, M., Tse, E. Pages 111-128. In *“Interactive Artifacts and Furniture Supporting Collaborative Work and Learning”*. Dillenbourg, P., Huang, J., and Cherubini, M., Eds. *CSCL Series*. Springer, New York, USA, 2008.

“Visualization, Estimation and User-Modeling for Interactive Browsing of Personal Photo Libraries”  
Tian Q, Moghaddam B, Lesh N, Shen C, Huang TS. In *Managing Multimedia Semantics*. Srinivasan U, Nepal S, Hershey, DOI: 10.4018/978-1-59140-569-6, ISBN13: 9781591405696, ISBN10: 1591405696, EISBN13: 9781591405436 PA: IRM Press; 2005. pp. 193-222.

## **Refereed Journal and Conference Papers**

2015

“Fluid Grouping: Quantifying Group Engagement around Interactive Tabletop Exhibits in the Wild”.  
Block, F., Hammerman, J.K.L., Horn, M.S., Phillips, B.C., Diamond, J., Evans, M.E. & Shen, C.  
*In Proc. ACM Conference on Human Factors in Computing Systems CHI’15*, ACM Press. 2015.  
**(BEST of CHI BEST PAPER AWARD, top 1%)**

"Whoa! We're going deep in the trees!": Patterns of collaboration around an interactive information visualization exhibit". Davis, P.; Horn, M. S.; Block, F.; Phillips, B.; Evans, M.; Diamond, J.; Shen., C., (2015):  
International Journal of Computer-Supported Collaborative Learning (IJCSCL), 2015.

“Visualizing the tree of life: Learning around an interactive visualization of biological data in museums”.  
Horn M., Phillips Evans Block Diamond Shen, 2015 NARST Annual International Conference (NARST 2015),

2014

“Build-a-Tree: Parent-child gaming to learn about evolution in museum settings”. Villanosa, K.; Block, F.;  
Horn, M.; Shen, C. (2014). *Games, Learning, and Society (GLS'14)*, Page(s): 7 pages, 2014.

2013

“Going Deep: Supporting collaborative exploration of evolution in natural history museums”.  
Davis, P., Horn MS, Schrementi L, Block F, Phillips B, Evans EM, Diamond J, Shen C. In *Proceedings Of Conference on Computer Supported Collaborative Learning (CSCL'13)*, Madison, Wisconsin. 2013  
**(BEST DESIGN PAPER AWARD)**

“Active prolonged engagement: When does it become active prolonged "learning"?”  
Evans, EM.; Phillips, B.; Horn, MM.; Block, F.; Diamond, J.; Shen, C.  
Presentation at the 2013 Society for Research in Child Development Biennial Meeting, In D. Uttal (Chair),  
*Developmental Research Outside the Lab: Children's STEM Learning In Museums*. Seattle, Washington,

“How is a human like a banana? Conceptions of humans as part of the natural world”  
Phillips, B.; Evans, M.; Horn, M.; Block, F.; Diamond, J.; Shen, C.  
Poster presented at the 2013 Society for Research in Child Development Biennial Meeting.  
*In J. Coley (Chair), Intuitive Concepts Versus Biological Science: The Case of Evolution, Seattle, Washington, 2013.*

2012

“The DeepTree Exhibit: Visualizing the Tree of Life to Facilitate Informal Learning”, Block, F., Horn, M.S., Phillips, B.C., Diamond, J., Evans, E.M., and Shen, C. *IEEE Transactions on Visualization and Computer Graphics* (TVCG), 18(12), Page(s): 2789 - 2798, 2012, ISSN: 1077-2626.

“FlowBlocks: A Multi-Touch UI for Crowd Interaction”, Block, F., Wigdor, D., Phillips, B.C., Horn, M., Shen, C., In *Proceedings of the 25th ACM symposium on User Interface Software and Technology*, (UIST'12), Page(s): 497-508, Cambridge, MA, 2012, ISBN:978-1-4503-1580-7.

“Of BATs and APES: An interactive tabletop game for natural history museums”, Horn, M.S., Leong, Z.A., Block, F., Diamond, J., Evans, E.M., Phillips, B., and Shen, C. (2012). In *Proc. ACM Conference on Human Factors in Computing Systems CHI'12*, ACM Press.

“Phylo-Genie: Engaging Students in Collaborative Tree- Thinking through Tabletop Techniques”, Schneider, B., Strait, M., Muller, L., Elfenbein, S., Shaer, O., Shen, C., In *Proc. ACM Conference on Human Factors in Computing Systems (CHI'12)*, ACM Press.

2010

"Upper Extremity Rehabilitation of Children with Cerebral Palsy using Accelerometer Feedback on a Multitouch Display", Alan Dunne, Son Do-Lenh, Gearóid Ó' Laighin, Chia Shen, Paolo Bonato, *the Proceedings of 32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'10)*, 1st - 4th September, 2010.

2009

"Visualizing Biodiversity with Voronoi Treemaps", Horn, M.S., Tobiasz, M., Shen, C., *Sixth annual International Symposium on Voronoi Diagrams in science and engineering*, Copenhagen, Denmark. June 23 - 26, 2009.

"Frogs and Toads Memory: A Voronoi Twist on the Classic Children's Game", Horn, M.S., Shen, C., *Sixth annual International Symposium on Voronoi Diagrams in science and engineering*, Copenhagen, Denmark. June 23 - 26, 2009.

“CThru: Exploration in a Video-Centered Information Space for Educational Purposes” Jiang, H., Viel, A., Bajaj, M., Lue, R.A., Shen, C., Pages 1247-1250. *Proc. of ACM CHI 2009*.

“The WeSpace: The Design, Development and Deployment of a Walk-Up and Share Multi-Surface Visual Collaboration System”. Wigdor, D., Jiang, H., Forlines, C., Borkin, M., Shen, C. Pages 1237-1246 *Proc. of ACM CHI 2009*.

2008

"Combining and Measuring the Benefits of Bimanual Pen and Direct-Touch Interaction of Interfaces", Brandl, P., Forlines, C., Wigdor, D., Haller, M., Shen, C., *International Working Conference on Advanced Visual Interfaces (AVI)*, ISBN: 0-978-60558-141-5, pp. 154-161, May 2008 (ACM Press)

“LivOlay: Interactive Ad-Hoc Registered Overlapping of Applications for Collaborative Visual Exploration”, Jiang, H., Wigdor, D., Forlines, C., Borkin, M., Kauggmann, J., Shen, C. In *Proceedings of CHI 2008*, Florence, Italy, April 5-10, 2008, 4 pages

“System Design for the Extension of Personal Devices to a Table-Centered Multi-User, Multi-Surface Environment in the WeSpace”, Jiang, H., Wigdor, D., Forlines, C., Shen, C., *Proceedings of IEEE Tabletops and Interactive Surfaces 2008*, Amsterdam, the Netherlands, Oct 1-3, 2008.

2007

“LucidTouch: A See-Through Mobile Device”, Wigdor, D., Forlines, C., Baudisch, P., Barnwell, J., Shen, C., (2007). *Proceedings of the 20th Annual ACM Symposium on User Interface Software and Technology*, Newport, Rhode Island, October 7-10, 2007, 10 pages ACM press.

“Multimodal Multiplayer Tabletop Gaming”, Tse, E., Greenberg, S., Shen, C., Forlines, C., *ACM Computers in Entertainment*, Vol. 5, No. 2. Article 12. Publication Date: August 2007. 12 pages. DOI=10.1145/1279540.1279552 <http://doi.acm.org/10.1145/1279540.1279552>

“Direct-Touch vs. Mouse Input for Tabletop Displays”, Forlines, C., Wigdor, D., Shen, C., Balakrishnan, R. (2007). *Proceedings of the 2007 ACM Conference on Human Factors in Computing Systems (CHI)*. ACM Press.

“Perception of Elementary Graphical Elements in Tabletop and Multi-Surface Environments”, Wigdor, D., Shen, C., Forlines, C., Balakrishnan, R. (2007). *Proceedings of the 2007 ACM Conference on Human Factors in Computing Systems(CHI)*. ACM Press.

“How Pairs Interact Over a Multimodal Digital Table”, Tse, E., Shen, C., Greenberg, S., Forlines, C. (2007). *Proceedings of the 2007 ACM conference on Human factors in Computing Systems (CHI)*. ACM Press.

2006

“Multimodal Multiplayer Tabletop Gaming”, Tse, E., Greenberg, S., Shen, C., Forlines, C., *Proceedings of the International Workshop on Pervasive Gaming Applications (PerGames 2006, Dublin, Ireland May 07<sup>th</sup>, 2006)*. **(BEST PAPER AWARD)**

“Exploring the Effects of Group Size and Display Configuration on Visual Search”, Forlines, C., Shen, C., Wigdor, D., Balakrishnan, R., *Proceedings of the 2006 ACM conference on Computer supported cooperative work*, (Banff, Alberta, Canada, 2006), ACM Press.

“Multi-User, Multi-Display Interaction with a Single-User, Single-Display Geospatial Application” Forlines, C., Esenther, A., Shen, C., Wigdor, D., and Ryall, K. *Proceedings of the 2006 ACM conference on User Interface Software and Technology*, (Montreux, Switzerland, 2006), ACM Press.

“Under the Table Interaction”, Wigdor, D., Leigh, D., Forlines, C., Shen, C., Shipman, S., Barnwell, J., and Balakrishnan, R. *Proceedings of the 2006 ACM conference on User Interface Software and Technology*, (Montreux, Switzerland, 2006), ACM Press.

“Informing the Design of Direct-Touch Tabletops”, Shen, C., Ryall, K., Forlines, C., Esenther, A., Vernier, F.D., Everitt, K., Wu, M., Wigdor, D., Morris, M.R., Hancock, M., and Tse, E., *Special Issue of IEEE Computer Graphics and Applications*, September/October, 2006.

“Table-Centric Interactive Spaces for Real-Time Collaboration: Solutions, Evaluation, and Application Scenarios”, Wigdor, D., Shen, C., Forlines, C., Balakrishnan, R., *CollabTech 2006*, July 2006.

“Enabling Interaction with Single User Applications through Speech and Gestures on a Multi-User Tabletop”, E. Tse, C. Shen, S. Greenberg, C. Forlines, *Advanced Visual Interfaces(AVI) 2006. May 23 -2, 2006, Venice, Italy*.



“Effects of Display Position and Control Space Orientation on User Preference and Performance”, D. Wigdor, C. Shen, C. Forlines, R. Balakrishnan. *Proceedings of CHI 2006*. April 22-27, 2006,, Montreal, Quebec, Canada.

“Rotation and Translation Mechanisms for Tabletop Interaction”. M.S. Hancock, F.D. Vernier, D. Wigdor, S. Carpendale, and C. Shen. *IEEE International Workshop on Horizontal Interactive Human-Computer Systems (TableTop)*, Adelaide, Australia, January 2006. (pp. 79-88) IEEE Computer Society Order Number P2494, ISBN 0-7695-2494-X

“Gesture Registration, Relaxation, and Reuse for Multi-Point Direct-Touch Surfaces”. M. Wu, C. Shen, K. Ryall, C. Forlines, and R. Balakrishnan. *IEEE International Workshop on Horizontal Interactive Human-Computer Systems (TableTop)*, Adelaide, Australia, January 2006. (pp. 183-190) IEEE Computer Society Order Number P2494, ISBN 0-7695-2494-X

“MultiSpace: Enabling Electronic Document Micro-mobility in Table-Centric, Multi-Device Environments”. K. Everitt, C. Shen, K. Ryall, and C. Forlines. *IEEE International Workshop on Horizontal Interactive Human-Computer Systems (TableTop)*, Adelaide, Australia, January 2006. (pp. 27-34) IEEE Computer Society Order Number P2494, ISBN 0-7695-2494-X

“Experiences With and Observations of Direct-Touch Tables”, Ryall, K., Ringel Morris, M., Everitt, K., Forlines, C., Shen, C., *IEEE International Workshop on Horizontal Interactive Human-Computer Systems (TableTop)*, Adelaide, Australia, January 2006. (pp. 89-96) IEEE Computer Society Order Number P2494, ISBN 0-7695-2494-X

2005

"Visualization, Estimation and User-Modeling for Interactive Browsing of Personal Photo Libraries," Q. Tian, B. Moghaddam, N. Lesh, C. Shen, and T.S. Huang. *Chapter 9, pp. 193-222, Book Chapter of Managing Multimedia Semantics*, edited by Dr. U. Srinivasan and Dr. S. Nepal, ICT Centre CSIRO, Australia, July 2005, ISBN 1-59140-569-6.

“DTLens: multi-user tabletop spatial data exploration”. C. Forlines and C. Shen. *Proceedings of the 18th Annual ACM Symposium on User interface Software and Technology* (Seattle, WA, USA, October 23 - 26, 2005). UIST '05. ACM Press, New York, NY. pp. 119-122.

“DocuBits and Containers: Providing e-Document Micro-Mobility in a Walk-up Interactive Tabletop Environment”. K. Everitt, C. Shen, K. Ryal, and C. Forlines *Proceedings of Human-Computer Interaction - INTERACT 2005: IFIP TC13 International Conference* (Rome, Italy, 2005), pp. 998-1001.

“Under My Finger: Human Factors in Pushing and Rotating Documents Across the Table”. C. Forlines, C. Shen, and F.D. Vernier. *Proceedings of Human-Computer Interaction - INTERACT 2005: IFIP TC13 International Conference*, (Rome, Italy, 2005), pp. 994-997.

“iDwidgets: Parameterizing Widgets by User Identity”. K. Ryall, A. Esenther, K. Everitt, C. Forlines, M.R. Morris, C. Shen, S. Shipman, and F.D. Vernier, *Proceedings of Human-Computer Interaction - INTERACT 2005: IFIP TC13 International Conference*, (Rome, Italy, 2005), pp. 1124-1128.

“Exploring Non-Speech Auditory Feedback at an Interactive Multi-User Tabletop”. M.S. Hancock, C. Shen, C. Forlines, and K. Ryall. *Proceedings of the 2005 Conference on Graphics interface* (Victoria, British Columbia, May 09 - 11, 2005). ACM International Conference Proceeding Series, vol. 112, pp. 41-50.

“CoR<sup>2</sup>DS: Context-Rooted Rotatable Draggables for Tabletop Interaction”. C. Shen, M.S. Hancock, C. Forlines, and F.D. Vernier. *ACM CHI '05 Extended Abstracts on Human Factors in Computing Systems* (Portland, OR, USA, April 02 - 07, 2005). CHI '05. ACM Press, New York, NY, pp. 1781-1784.

“Glimpse: A Novel Input Model for Multi-Level Devices”. C. Forlines, C. Shen, and B. Buxton. *ACM CHI '05 Extended Abstracts on Human Factors in Computing Systems* (Portland, OR, USA, April 02 - 07, 2005). CHI '05. ACM Press, New York, NY, pp. 1375-1378.

“Modal Spaces: Spatial Multiplexing to Mediate Direct-Touch Input on Large Displays”. K. Everitt, C. Shen, K. Ryall, and C. Forlines. *CHI '05 Extended Abstracts on Human Factors in Computing Systems* (Portland, OR, USA, April 02 - 07, 2005). CHI '05. ACM Press, New York, NY, pp. 1359-1362.

2004

“Conflict Resolution in Paper and Digital Worlds: Two Surveys of User Expectations”. Morris, MR, Forlines C, Ryall K, Shen C. 2004. *Proceedings of CSCW 2004* (Chicago, Illinois, USA, November 06-10, 2004). CSCW 2004. ACM Press, New York, NY.

“Observations of a Shared Tabletop User Study”. Everitt, K, Forlines C, Ryall K, Shen C. 2004. *Proceedings of CSCW 2004* (Chicago, Illinois, USA, November 06 - 10, 2004). CSCW '04. ACM Press, New York, NY.

“Beyond Social Protocols: Multi-User Coordination Policies for Co-located Groupware”. M.R. Morris, K. Ryall, C. Shen, C. Forlines, and F.D. Vernier, *Proceedings of CSCW 2004* (Chicago, Illinois, USA, November 06 - 10, 2004). CSCW '04. ACM Press, New York, NY, pp. 262-265.

“Exploring the Effects of Group Size and Table Size on Interactions with Tabletop Shared-Display Groupware”. K. Ryall, C. Forlines, C. Shen, and M.R. Morris. *Proceedings of CSCW 2004*. (Chicago, Illinois, USA, November 06 - 10, 2004). CSCW '04. ACM Press, New York, NY, pp. 284-293.

“A New Multi-path Selection Scheme for Video Streaming on Overlay Networks”. Z. Ma, H-R Shao, and C. Shen. *IEEE International Conference on Communications (ICC)*, June 2004. Volume: 3, pp. 1330-1334  
ISBN: 0-7803-8533-0 (Digital Object Identifier: 10.1109/ICC.2004.1312728)

“DiamondSpin: An Extensible Toolkit for Around-the-Table Interaction”. C. Shen, F.D. Vernier, C. Forlines, M. Ringel. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Vienna, Austria, April 24 - 29, 2004). CHI '04. ACM Press, New York, NY, pp. 167-174.

“Release, Relocate, Reorient, Resize: Fluid Techniques for Document Sharing on Multi-User Interactive Tables”. M. Ringel, K. Ryall, C. Shen, C. Forlines, F.D. Vernier. *CHI '04 Extended Abstracts on Human Factors in Computing Systems* (Vienna, Austria, April 24 - 29, 2004). CHI '04. ACM Press, New York, NY, pp. 1441-1444

“Visualization and User-Modeling for Browsing Personal Photo Libraries”. B. Moghaddam, Q. Tian, N. Lesh, C. Shen, T.S. Huang. *Int. Journal of Computer Vision*, 56 (1/3) pp.109-130, Jan-Mar 2004.  
2003

“UbiTable: Impromptu Face-to-Face Collaboration on Horizontal Interactive Surfaces”. C. Shen, K.M. Everitt, K. Ryall. *Proceedings of UbiComp 2003*. LNCS 2864. pp. 281-288.

“FGS Enhancement Layer Truncation with Minimized Intra-Frame Quality Variation”. J. Zhou, H-R. Shao, C. Shen, M-T. Sun. *IEEE Int. Conf. on Multimedia and Expo (ICME)*, Vol. 2, pp. 361-364, 2003.

“Personal Digital Historian: Story Sharing Around the Table”. C. Shen, N. Lesh, F.D. Vernier. *ACM Interactions*, ISSN:1072-5520, Vol. 10, Issue 2, pp. 15-22, March/April 2003.

“Dynamic Resource Control for High-Speed Downlink Packet Access Wireless Channel”. H-R Shao, C. Shen, D. Gu, J. Zhang, P. Orlik. *Int. Conf. on Distributed Computing Systems Workshops*, pp. 838-843, May 2003. (DOI Bookmark: <http://doi.ieeecomputersociety.org/10.1109/ICDCSW.2003.1203656>)

## 2002

“Sharing and Building Digital Group Histories”. C. Shen, N.B. Lesh, F.D. Vernier, C. Forlines, J. Frost. *Proceedings of the 2002 ACM Conference on Computer Supported Cooperative Work* (New Orleans, Louisiana, USA, November 16 - 20, 2002). CSCW '02. ACM Press, NY, NY, pp. 324-333.

“Building Reliable Component-Based Software Systems”. Gonzalez, O., Ramamritham, K., Shen, C., Fohler, G. *Artech House Publishers, ISBN 1-58053-327-2*, Chapter 15, July 2002.

“Visualization Techniques for Circular Tabletop Interfaces”. F.D. Vernier, N.B. Lesh, C. Shen. *Proceedings of AVI'2002* (Trento, Italy, May 22 - 24, 2002). pp. 257-263.

## 2001

“Adaptive-Weighted Packet Scheduling for Premium Service”. H. Wang, C. Shen, K. Shin. *IEEE International Conference on Communications (ICC)* (Helsinki, Finland, June 11-14, 2001) Vol 6, pp. 1846-1850, June 2001.

“Personal Digital Historian: User Interface Design”. C. Shen, N.B. Lesh, B. Moghaddam, P.A. Beardsley, R.S. Bardsley. *CHI '01 Design Expo, Extended Abstracts on Human Factors in Computing Systems* CHI '01. ACM Press, New York, NY, pp. 29-30.

“Visualization and Layout for Personal Photo Libraries”. Moghaddam B., Tian Q. N., Lesh, N.B., Shen, C., Huang, T.S. *Content-Based Multimedia Indexing (CBMI'01)*, Brescia, Italy, September 18-20th, 2001.

“Building Real-Time Systems with Commercial-Off-The-Shelf Components”. O. Gonzalez, K. Ramamritham, C. Shen, and G. Fohler. Book Chapter in *Building Reliable Component-Based Systems*, Ivica Crnkovic and Magnus Larsson (editors), Artech House Publishers, 2001.

## 2000

“Adaptive-Weighted Packet Scheduling for Premium Service”. H.N. Wang, C. Shen, K.G. Shin. *ICC 2001 (IEEE International Conference on Communications)*, June 11-14, 2001. Helsinki, Finland.

“RT-CRM: Real-Time Channel-Based Reflective Memory”. C. Shen, I. Mizunuma. *IEEE Transactions on Computers*, November 2000. Vol 49, No 11, pps 1202-1214.

“CReMeS: A CORBA Compliant Reflective Memory Based Real-Time Communication Service”. S-T Chung, Gonzalez, O., Ramamritham, K., Shen, C. *Proceedings of the 21<sup>st</sup> IEEE Real-Time Systems Symposium (RTSS 2000)*, Orlando, FL, 27-30 Nov. 2000. pp. 47-56.

## 1999

“User Level Scheduling of Communicating Real-Time Tasks”. Shen, C., Gonzalez, O., Ramamritham, K., Mizunuma, I. *IEEE Real-Time Technology and Applications Symposium (RTAS)*, 164-175, 1999.

1998

“Real-Time Communicating Tasks on COTS-based Distributed Platforms: Task Models and End-to-End Scheduling”. C. Shen, O. Gonzalez. *Proceedings of IEEE Real-Time Systems Symposium*, December 2-6, 1998. Madrid, Spain.

“Using Windows NT for Real-Time Applications: Experimental Observations and Recommendations”. K. Ramamritham, C. Shen, O. Gonzalez, S. Sen, and S.B. Shirkurkar. *In Proceedings of IEEE Real-Time Technology and Applications Symposium*, Denver, Colorado, June 3 - 5, 1998.

“The Experience Journal: Using Technology to Share Personal Stories about Medical Interventions”. E. Ackermann, D. Bromley, D. R. DeMaso, S. Gibson, J. Gonzalez-Heydrich, J. Marks, C. Shen, and M. Umaschi. *Proceedings of MedInfo '98: 9th World Congress on Medical Informatics*, 1325-1329, 1998. (ISBN 90 5199 407 9 (IOS Press)).

1997

“RT-CRM: Real-Time Channel-Based Reflective Memory”. Shen, C., Mizunuma, I. *IEEE Real-Time Technology and Applications Symposium (RTAS)*, Montreal, Canada, June 1997. 239-251.

“Multimedia Capabilities in Distributed Real-Time Applications”. S. Sen, O. Gonzalez, K. Ramamritham, J.A. Stankovic, C. Shen, and M. Takegaki. In *Real-Time Database Systems: Issues and Applications*, Sang Son, Kwei-Jay and Azer Bestavros, Ed., Kluwer Academic Publishers, 1997, pp. 105-122.

“Implementation and Performance of MidART”. O. Gonzalez, C. Shen, I. Mizunuma, M. Takegaki. In *Proceedings of IEEE Workshop on Middleware for Distributed Real-Time Systems and Services*, December 2, 1997. San Francisco, CA.

1996

“Middleware for Distributed Industrial Real-Time Systems on ATM Networks”. I. Mizunuma, C. Shen, M. Takegaki. In *Proceedings of the 17<sup>th</sup> IEEE Real-Time Systems Symposium (RTSS '96)*, December 4-6, 1996. Washington, DC, pp. 32-38.

“A Reliable, Adaptive Network Protocol For Video Transport”. P. Goyal, H. M. Vin, C. Shen, P. J. Shenoy. In *Proceedings of IEEE INFOCOM '96*, March 24 - 28, 1996 San Francisco, CA.

1995

“Building Multi-User Interactive Multimedia Environments at MERL”. D. B. Anderson, J. W. Barrus, J. H. Howard, C. Rich, C. Shen and R. C. Waters. *IEEE MultiMedia*, Vol. 2, NO. 4, Winter 1995. IEEE Computer Society Press.

“Digital Audio and Video in Industrial Systems”. H.C. Lauer, C. Shen, R. Osborne, J. Howard, Q. Zheng, M. Takegaki, H. Shimakawa, and I. Mizunuma. *NOSSDAV '95*, April 18 - 22, 1995 Durham, New Hampshire.

1993

“Resource Reclaiming in Multiprocessor Real-Time Systems”. C. Shen, K. Ramamritham, and J.A. Stankovic. *IEEE Transactions on Parallel and Distributed Systems*, Vol. 4, NO. 4, April, 1993. pp. 382-397.

1990

“Predictable Synchronization Mechanisms for Multiprocessor Real-Time Systems”. L.D. Molesky, C. Shen, and G. Zlokapa. *The Journal of Real-Time Systems*, Vol. 2, No. 3, Sept. 1990.

“Implementing a Predictable Real-Time Multiprocessor Kernel -- The Spring Kernel”. L.D. Molesky, K. Ramamritham, C. Shen, J.A. Stankovic, and G. Zlokapa. *The Seventh IEEE Workshop on Real-Time Operating Systems and Software*, Charlottesville, VA., May 10-11, 1990.

1986

“Genesis: A Graphical Environment for the Modeling and Performance Analysis of Protocols in Multiple Access Networks”. J. Kurose, C. Shen. *IEEE International Conference on Communications, ICC '86, Integrating the World Through Communications, June 22-25, 1986, Toronto, Canada, Proceedings. IEEE, 1986, Volume 1, 222-227.*

## PATENTS

1. Multi-User Collaborative Graphical User Interfaces  
United States Patent Number 7,327,376
2. Adaptive-Weighted Packet Scheduler for Supporting Premium Service in a Communications Network  
United States Patent Number 6,990,113
3. Multi-Path Transmission of Fine-Granular Scalability Video Streams  
United States Patent Number 6,973,128
4. Multi-User Collaborative Circular Graphical User Interfaces  
United States Patent Number 6,894,703
5. Circular Graphical User Interfaces  
United States Patent Number 6,791,530
6. Multi-User Interactive Picture Presentation Systems and Methods  
United States Patent Number 6,545,066
7. User Level Scheduling of Intercommunicating Real-Time Tasks  
United States Patent Number 6,490,611
8. Method and System for Displaying Icons Representing Information Items Stored in a Database  
United States Patent Number 6,211,876
9. Real-Time Channel-Based Reflective Memory  
United States Patent Number 5,987,496
10. System and Process for Providing User Level Multiplexing of Two or More Application Channels to One Virtual Channel in Asynchronous Transfer Mode Network  
United States Patent Number 5,818,841
11. ATM Local Area Network Switch with Dual Queues  
United States Patent Number 5,732,087
12. Active Modules for Large Screen Display  
United States Patent Number 5,523,769
13. Tag-based Scheduling System for Digital Communication Switch  
United States Patent Number 5,455,825