

# Chia Shen

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## EDUCATION

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

University of Massachusetts, Amherst  
Thesis Area: Real-Time Systems – 1992

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

University of Massachusetts, Amherst  
Thesis Area: Multi-Access Computer Networks – 1986

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

SUNY Stony Brook – 1983

## PROFESSIONAL APPOINTMENTS

### Harvard University

2009 - Present                      *Director, SDR Lab,  
Senior Research Fellow, SEAS Harvard University*

June 2008 – July 2009            *Senior Scientist and Program Manager, IIC Harvard University*

Jan 2008 – May 2008              *Visiting Senior Scientist*

### University of Toronto The School of Graduate Studies

2007 – 2010                        *Member of the Graduate Faculty (Adjunct)*

### Mitsubishi Electric Research Laboratories

2003 – 2006                        *Associate Director and Senior Research Scientist*

2001 – 2008                        *Senior Research Scientist*

1993 – 2000                        *Research Scientist*

## SELECTED PROFESSIONAL ACTIVITIES

<i>Conference General Chair</i>	20 <sup>th</sup> ACM Symposium on User Interface Software and Technology (UIST) <a href="http://www.acm.org/uist/uist2007/">http://www.acm.org/uist/uist2007/</a>
<i>Steering Committee</i>	ACM International Conference on Interactive Tabletops and Surfaces (ITS)
<i>NSF Review Panel</i>	Information and Intelligent Systems (IIS), HCC
<i>Program Committees</i>	ACM ITS, ACM CHI, ACM UIST, Graphics Interface IEEE Real Time Systems Symposium IEEE Real Time Technology and Applications Symposium
<i>Editorial Board</i>	ACM “Computers in Entertainment”
<i>Consortium Representative</i>	ATM Forum, primary representative for Mitsubishi Electric corporation, Principal Member, April 1993 – May 1997 Primary responsibilities included presentation and representation to the standard meetings and technical committees.
<i>Conference and Journal Referee</i>	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
<i>Member</i>	ACM IEEE (Senior Member) IEEE Technical Committees <ul style="list-style-type: none"><li>• Real Time Systems (1998)</li><li>• Operating Systems and Application Environments (1999)</li></ul>
<i>Ph.D. Committee Member</i>	Oscar J. Gonzales, University of Massachusetts (Defense date: May 2000) Meredith Ringel Morris, Stanford University (Defense date: March 2006) Edward Tse, University of Calgary (Defense date: November 2007) Daniel Wigdor, University of Toronto (Defense date: March 2008)
<i>Post-Docs &amp; Interns Supervised</i>	Michael Horn: PhD, faculty member, Northwestern University Frederic D. Vernier: PhD, faculty member, University of Paris Meredith Ringel Morris: PhD, Microsoft Research Lab (Redmond, WA) Oscar J. Gonzales: PhD, Researcher, Bell Labs Pawan Goyal: PhD, Researcher, IBM Almaden Haining Wang PhD: Assistant Professor, College of William and Mary Qi Tian: PhD, Assistant Professor, University of Texas

Jeana Frost: PhD, MIT Media Lab  
Kate Everitt: PhD Candidate, University of Washington  
Mike Wu: PhD Candidate, University of Toronto  
Mark Hancock: PhD Candidate, University of Calgary  
Daniel Wigdor: PhD, Microsoft  
Edward Tse: PhD, SMARTTech  
Hao Jiang: Tsing Hua University  
Meekal Bajaj: Georgia Tech

## SELECTED INVITED LECTURES

- 2010 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 November 23, 2009
- 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  
<http://mcs.open.ac.uk/pm5923/si2007/>
- Keynote: Geodan Day “De kunst van Geo-Innovatie” (The Art of Geo-Innovation), Amsterdam, The Netherlands  
June 6, 2007
- 2006 Keynote address: 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*  
IBM Almaden, HCI seminar, July 10, 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 *Real Time Systems*, MIT, guest lecture

*MidART: Middleware Architecture for Distributed Real Time Systems*  
Microsoft Research Asia (Beijing, China)

*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

## PUBLICATIONS

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 Book Chapter: "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 *Dillenbourg, P., Huang, J., and Cherubini, M., Eds. "Interactive Artifacts and Furniture Supporting Collaborative Work and Learning". CSCL Series. Springer, New York, USA, 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 - in press.

"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*, San Jose, CA, April 30-May 3, 2007.

"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*.

"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*.

2006 "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  
<http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=33359&isYear=2006>  
(Digital Object Identifier 10.1109/TABLETOP.2006.26)

“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  
<http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=33359&isYear=2006>  
Digital Object Identifier 10.1109/TABLETOP.2006.19

“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  
<http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=33359&isYear=2006>  
(Digital Object Identifier 10.1109/TABLETOP.2006.23)

“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  
<http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=33359&isYear=2006>  
(Digital Object Identifier 10.1109/TABLETOP.2006.12)

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. Ryall, 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. *International Journal of Computer Vision*, 56 (1/3) pp.109-130, January-March 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 International Conference on Multimedia and Expo (ICME)*, Vol. 2, pp. 361-364, July 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. *International Conference 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, New York, 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* (Seattle, Washington, March 31 - April 05, 2001). 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.
- “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.
- 2000 “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, June 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. Shirgurkar. *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. pps 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 GRANTED

*Multi-User Collaborative Graphical User Interfaces*

Granted on September 20, 2007 (Patent number to be issued by U.S. PTO.)

*Adaptive-Weighted Packet Scheduler for Supporting Premium Service in a Communications Network*  
United States Patent Number 6,990,113

*Multi-Path Transmission of Fine-Granular Scalability Video Streams*  
United States Patent Number 6,973,128

*Multi-User Collaborative Circular Graphical User Interfaces*  
United States Patent Number 6,894,703

*Circular Graphical User Interfaces*  
United States Patent Number 6,791,530

*Multi-User Interactive Picture Presentation Systems and Methods*  
United States Patent Number 6,545,066

*User Level Scheduling of Intercommunicating Real-Time Tasks*  
United States Patent Number 6,490,611

*Method and System for Displaying Icons Representing Information Items Stored in a Database*  
United States Patent Number 6,211,876

*Real-Time Channel-Based Reflective Memory*  
United States Patent Number 5,987,496

*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

*ATM Local Area Network Switch with Dual Queues*  
United States Patent Number 5,732,087

*Active Modules for Large Screen Display*  
United States Patent Number 5,523,769

*Tag-based Scheduling System for Digital Communication Switch*  
United States Patent Number 5,455,825

## **PATENTS PENDING**

*Method and Systems for Manipulating Graphical Objects Displayed on a Touch-Sensitive Display Surface Using Displaced Pop-ups*

*Spatial Multiplexing to Mediate Direct-Touch Input on Large Displays*

*Conflict Resolution for Graphic Multi-User Interface*

*Controlled Interactive Display of Content Using Networked Computer Devices*