

BEN LIANG

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Dept. of Electrical and Computer Engineering

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EDUCATION

Cornell University, Ithaca, New York (1997 – 2001)

Ph.D. in Electrical Engineering with Minor in Computer Science, August 2001

Dissertation: *Reducing Terminal Location Uncertainty in Wireless Network Mobility Management*

Advisor: Zygmunt J. Haas

Polytechnic University (currently the Polytechnic Institute of New York University),
Brooklyn, New York (1993 – 1997)

Honors Simultaneous B.S. (*Valedictorian*) and M.S. in Electrical Engineering, May 1997

Thesis: *Blind Image Deconvolution and a Robust GCD Approach*

Advisor: S. Unnikrishna Pillai

PROFESSIONAL EXPERIENCE

Associate Professor (July 2007 – present)

Department of Electrical and Computer Engineering, University of Toronto, Toronto, Ontario

Assistant Professor (July 2002 – June 2007)

Department of Electrical and Computer Engineering, University of Toronto, Toronto, Ontario

Visiting Lecturer and Post-doctoral Associate (September 2001 – May 2002)

School of Electrical and Computer Engineering, Cornell University, Ithaca, New York

Other Positions

- Graduate Research Fellow (September 1997 – August 2001)
School of Electrical and Computer Engineering, Cornell University, Ithaca, New York
- Teaching Assistant (part-time, September 1999 – December 1999)
School of Electrical and Computer Engineering, Cornell University, Ithaca, New York
- Graduate Research Fellow (September 1996 – May 1997)
Department of Electrical Engineering, Polytechnic University, Brooklyn, New York
- Undergraduate Honors Research (May 1996 – August 1996)
Department of Electrical Engineering, Polytechnic University, Brooklyn, New York
- Tutor (part-time, February 1995 – May 1996)
Office of Special Services and Learning Center, Polytechnic University, Brooklyn, New York
- Tutor (part-time, February 1995 – May 1996)
Higher Learning, New York, New York
- Internship (part-time, December 1994 – September 1995)
Bioengineering Laboratory, Hospital for Joint Diseases, New York, New York

AWARDS AND HONORS:

- Early Researcher Award (ERA), Ontario Ministry of Research and Innovation, 2007
 - Commendation for teaching excellent from ECE department chair for spring 2005 and fall 2007
 - Runner-up Best Paper Award in the International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine), 2006
 - Best Paper Award in the IFIP Networking Conference, 2005
 - Intel Foundation Graduate Fellowship, 2000
 - Lockheed Martin Fellowship in Communication and Information Technologies, 1999
 - Richard W. Block Award for the highest ranking graduate, Polytechnic University, 1997
 - William L. Everitt Student Award of Excellence, Polytechnic University, 1997
 - Weber Scholar, Polytechnic University, 1995 and 1996
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PUBLICATIONS

Papers in Refereed Journals and Magazines

- [J23] M. Lotfinezhad, B. Liang, and E. Sousa, "On stability region and delay performance of linear-memory randomized scheduling for time-varying networks," in press, to appear in the *IEEE/ACM Transactions on Networking*.
- [J22] Y. Lin, B. Liang, and B. Li, "Priority random linear codes in distributed storage systems," in press, to appear in the *IEEE Transactions on Parallel and Distributed Systems*.
- [J21] S. Vakil and B. Liang, "Cooperative diversity in interference limited wireless networks," *IEEE Transactions on Wireless Communications*, vol. 7, no. 8, pp. 3185 – 3195, August 2008.
- [J20] G. Liang and B. Liang, "Effect of delay and buffering on jitter-free streaming over random VBR channels," *IEEE Transactions on Multimedia*, vol. 10, no. 6, pp. 1128 – 1141, October 2008.
- [J19] A. So and B. Liang, "Optimal placement and channel assignment of relay stations in heterogeneous wireless mesh networks by modified Bender's decomposition," *Ad Hoc Networks (Elsevier)*, vol. 7, no. 1, pp. 118 – 135, January 2009 (invited from IFIP Networking 2007).
- [J18] Y. Lin, B. Li, and B. Liang, "Stochastic analysis of network coding in epidemic routing," *IEEE Journal on Selected Areas in Communications*, Special Issue on Delay and Disruption Tolerant Wireless Communication Systems, vol. 26, no. 5, pp. 794 – 808, June 2008.
- [J17] A. H. Zahran, B. Liang, and A. Saleh, "Mobility modeling and performance evaluation of heterogeneous wireless networks," *IEEE Transactions on Mobile Computing*, vol. 7, no. 8, pp. 1041 – 1056, August 2008.

- [J16] M. Lotfinezhad, B. Liang, and E. Sousa, "Adaptive cluster-based data collection in sensor networks with direct sink access," *IEEE Transactions on Mobile Computing*, vol. 7, no. 7, pp. 884 – 897, July 2008.
- [J15] A. Farbod and B. Liang, "Efficient structured policies for admission control in heterogeneous wireless networks," *ACM/Springer Mobile Networks and Applications*, vol. 12, no. 5, pp. 309 – 323, December 2007.
- [J14] A. H. Zahran and B. Liang, "A generic framework for mobility modeling and performance analysis in next-generation heterogeneous wireless networks," *IEEE Communications Magazine*, vol. 45, no. 9, pp. 92 – 99, September 2007.
- [J13] A. So and B. Liang, "An efficient wireless extension point placement algorithm in urban rectilinear WLANs," *IEEE Transactions on Vehicular Technology*, vol. 47, no. 1, pp. 532 – 547, January 2008.
- [J12] B. Liang, S. Drew, and D. Wang, "Performance of multiuser network-aware prefetching in heterogeneous wireless systems," *ACM/Springer Wireless Networks*, vol. 16, no. 1, pp. 99 – 110, January 2009 (Online First edition appeared February 2007).
- [J11] B. Liang and M. Dong, "Packet prioritization in multihop latency aware scheduling for delay constrained communication," *IEEE Journal on Selected Areas in Communications*, Special Issue on Cross-Layer Optimized Wireless Multimedia Communications, vol. 25, no. 4, pp. 819-930, May 2007.
- [J10] A. So and B. Liang, "Enhancing WLAN capacity by strategic placement of tetherless relay points," *IEEE Transactions on Mobile Computing*, vol. 6, no. 5, pp. 522-535, May 2007.
- [J9] K. Yuen, B. Liang, and B. Li, "A distributed framework for correlated data gathering in sensor networks," *IEEE Transactions on Vehicular Technology*, vol. 57, no. 1, pp. 578 – 593, January 2008.
- [J8] J. Eshet and B. Liang, "Randomly ranked mini slots for fair and efficient medium access control in ad hoc networks," *IEEE Transactions on Mobile Computing*, vol. 6, no. 5, pp. 481-493, May 2007.
- [J7] T. Small, B. Li, and B. Liang. "Outreach: peer-to-peer topology construction towards minimized server bandwidth costs," *IEEE Journal on Selected Areas in Communications*, Special Issue on Peer-to-Peer Communications and Applications, vol. 25, no. 1, pp. 35-45, January 2007.
- [J6] A. H. Zahran, B. Liang, and A. Saleh, "Signal threshold adaptation for vertical handoff in heterogeneous wireless networks," *ACM/Springer Mobile Networks and Applications*, Special Issue on Soft Radio Enabled Heterogeneous Networks, vol. 11, no. 4, pp. 625-640, August 2006.
- [J5] B. Liang and Z. J. Haas, "Hybrid routing in ad hoc networks with a dynamic virtual backbone," *IEEE Transactions on Wireless Communications*, vol. 5, no. 6, pp. 1392-1405, June 2006.
- [J4] Y. Fang, Z. J. Haas, B. Liang, and Y.-B. Lin "TTL prediction schemes and effects of inter-update time distribution on wireless data access," *ACM/Kluwer Wireless Networks*, vol. 10, no. 5, pp. 607–619, September 2004.

- [J3] B. Liang and Z. J. Haas, "Predictive distance-based mobility management for multi-dimensional PCS networks," *IEEE/ACM Transactions on Networking*, vol. 11, no. 5, pp. 718-732, October 2003.
- [J2] Z. J. Haas and B. Liang, "Ad hoc mobility management with uniform quorum systems," *IEEE/ACM Transactions on Networking*, vol. 7, no. 2, pp. 228-240, April 1999.
- [J1] S. U. Pillai and B. Liang, "Blind image deconvolution using a robust GCD approach," *IEEE Transactions on Image Processing*, vol. 8, no 2, pp. 295-301, February 1999.

Papers in Refereed Conferences

- [C61] J. Deng, Y. Han, and B. Liang, "Fairness index based on variational distance," to be presented in the IEEE Global Telecommunications Conference (GLOBECOM), Honolulu, Hawaii. (35% acceptance rate)
- [C60] G. Ji and B. Liang, "Stochastic rate control for scalable VBR video streaming over wireless networks," to be presented in the IEEE Global Telecommunications Conference (GLOBECOM), Honolulu, Hawaii. (35% acceptance rate)
- [C59] M. Hajiaghayi, M. Dong, and B. Liang, "Using limited feedback in power allocation design for a two-hop relay OFDM system," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Dresden, Germany, June 2009. (35% acceptance rate)
- [C58] G. Ji, B. Liang, and A. Saleh, "Buffer schemes for VBR video streaming over heterogeneous wireless networks," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Dresden, Germany, June 2009. (35% acceptance rate)
- [C57] A. Farbod and B. Liang, "Structured admission control policies in heterogeneous wireless networks with mesh underlay," in *Proceedings of the IEEE Conference on Computer Communications (INFOCOM)*, Rio de Janeiro, Brazil, April 2009. (**19.6% acceptance rate**)
- [C56] Y. Lin, B. Liang, and B. Li, "Passive loss inference in wireless sensor networks based on network coding," in *Proceedings of the IEEE Conference on Computer Communications (INFOCOM)*, Rio de Janeiro, Brazil, April 2009. (**19.6% acceptance rate**)
- [C55] Y. Lin, B. Li, and B. Liang. "CodeOR: opportunistic routing in wireless mesh networks with segmented network coding," in *Proceedings of the 16th IEEE International Conference on Network Protocols (ICNP)*, Orlando, Florida, October 2008. (**16% acceptance rate**)
- [C54] M. Lotfinezhad, B. Liang, and E. Sousa, "Dynamic control of tunable sub-optimal algorithms for scheduling of time-varying wireless networks," in *Proceedings of the IEEE International Workshop on Quality of Service (IWQoS)*, Enschede, Netherlands, June 2008.
- [C53] S. Vakil and B. Liang, "Effect of joint cooperation and multi-hopping on the capacity of wireless networks," in *Proceedings of the IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)*, San Francisco, California, June 2008. (**21% acceptance rate**)
- [C52] M. Ibrahim and B. Liang, "Efficient power allocation in cooperative OFDM system with channel variation," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Beijing, China, May 2008. (35% acceptance rate)

- [C51] Y. Lin, B. Liang, and B. Li, "Geometric random linear codes in sensor networks," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Beijing, China, May 2008. (35% acceptance rate)
- [C50] T. Small, B. Li, and B. Liang, "Topology affects the efficiency of network coding in peer-to-peer networks," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Beijing, China, May 2008. (35% acceptance rate)
- [C49] Y. Lin, B. Li, and B. Liang, "Efficient network coded data transmissions in disruption tolerant networks," in *Proceedings of the IEEE Conference on Computer Communications (INFOCOM)*, Phoenix, Arizona, April 2008. (**21% acceptance rate**)
- [C48] A. H. Zahran and B. Liang, "Call admission control analysis in heterogeneous wireless networks," in *Proceedings of the International Computer Engineering Conference (ICENCO)*, Cairo, Egypt, December 2007.
- [C47] A. Farbod and B. Liang, "Optimal admission control policies for heterogeneous wireless networks," in *Proceedings of the International Conference on Heterogeneous Networking for Quality, Reliability, Security and Robustness (QShine)*, Vancouver, British Columbia, August 2007.
- [C46] M. Lotfinezhad, B. Liang, and E. Sousa, "On the stability region of linear-memory scheduling for time varying channels," in *Proceedings of the IEEE International Workshop on Quality of Service (IWQoS)*, Evanston, Illinois, June 2007, (short paper).
- [C45] Y. Lin, B. Liang, and B. Li, "Performance modeling of network coding in epidemic routing," in *Proceedings of the ACM International Workshop on Mobile Opportunistic Networking (MobiOpp)*, San Juan, Puerto Rico, June 2007.
- [C44] Y. Lin, B. Li, and B. Liang, "Differentiated data persistence with priority random linear codes," in *Proceedings of the IEEE International Conference on Distributed Computing Systems (ICDCS)*, Toronto, Ontario, June 2007. (**13.4% acceptance rate**)
- [C43] S. Vakil and B. Liang, "Decentralized multiuser diversity with cooperative relaying in wireless sensor networks," in *Proceedings of the IEEE Communication Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)*, San Diego, California, June 2007. (**20% acceptance rate**)
- [C42] A. So and B. Liang, "Minimum cost configuration of relay and channel infrastructure in heterogeneous wireless mesh networks," in *Proceedings of the IFIP Networking*, Atlanta, Georgia, May 2007. (**22.5% acceptance rate**)
- [C41] A. H. Zahran, B. Liang, and A. Saleh, "Impact of technology overlap in next-generation wireless heterogeneous systems," in *Proceedings of the IFIP Networking*, Atlanta, Georgia, May 2007. (**22.5% acceptance rate**)
- [C40] J. Lau and B. Liang, "Optimal pricing for selfish users and prefetching in heterogeneous wireless networks," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Glasgow, Scotland, June 2007. (39% acceptance rate)
- [C39] G. Liang and B. Liang, "Balancing interruption frequency and buffering penalties in VBR video streaming," in *Proceedings of the IEEE Conference on Computer Communications (INFOCOM)*, Anchorage, Alaska, May 2007. (**18% acceptance rate**)

- [C38] Y. Lin, B. Liang, and B. Li, "Data persistence in large-scale sensor networks with decentralized fountain codes," in *Proceedings of the IEEE Conference on Computer Communications (INFOCOM)*, Anchorage, Alaska, May 2007. **(18% acceptance rate)**
- [C37] T. Small, B. Liang, and B. Li. "Scaling laws and tradeoffs in peer-to-peer live multimedia streaming," in *Proceedings of ACM Multimedia*, Santa Barbara, California, October 2006, pp. 539 - 548. **(16% acceptance rate)**
- [C36] S. Vakil and B. Liang, "Balancing cooperation and interference in wireless sensor networks," in *Proceedings of the IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)*, Reston, Virginia, September 2006, pp. 198 - 206. **(25.9% acceptance rate)**
- [C35] G. Liang and B. Liang, "Jitter-free probability bounds for video streaming over random VBR channel," in *Proceedings of the International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine)*, Waterloo, Ontario, August 2006, **(Runner-up Best Paper Award)**.
- [C34] B. Liang and S. Drew, "Multiuser prefetching with queuing prioritization in heterogeneous wireless systems," in *Proceedings of the International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine)*, Waterloo, Ontario, August 2006.
- [C33] A. So and B. Liang, "Optimal placement of relay infrastructure in heterogeneous wireless mesh networks by bender's decomposition," in *Proceedings of the International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine)*, Waterloo, Ontario, August 2006, (poster).
- [C32] A. H. Zahran, B. Liang, and A. Saleh, "Modeling and performance analysis of beyond 3G integrated wireless networks," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Istanbul, Turkey, June 2006, pp. 1819 - 1824. (39.0% acceptance rate)
- [C31] K. Yuen, B. Li, and B. Liang, "Distributed minimum energy data gathering and aggregation in sensor networks," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Istanbul, Turkey, June 2006, pp. 3536 - 3541. (39.0% acceptance rate)
- [C30] A. H. Zahran, B. Liang, and A. Saleh, "Beyond 3G wireless network design for optimal resource utilization," in *Proceedings of the 23rd Biennial Symposium on Communications*, Kingston, Ontario, June 2006.
- [C29] T. Small, B. Li, and B. Liang, "On optimal peer-to-peer topology construction with maximum peer bandwidth contributions," in *Proceedings of the 23rd Biennial Symposium on Communications*, Kingston, Ontario, June 2006.
- [C28] A. Farbod, G. Liang, and B. Liang, "Vertical handoff provisioning and capacity planning in the deployment of hybrid networks," in *Proceedings of the 23rd Biennial Symposium on Communications*, Kingston, Ontario, June 2006.
- [C27] S. Vakil and B. Liang, "Relaying in wireless sensor networks with interference mitigation," in *Proceedings of the 23rd Biennial Symposium on Communications*, Kingston, Ontario, June 2006.
- [C26] B. Liang and M. Dong, "Balancing distance and lifetime in delay constrained ad hoc networks," in *Proceedings of the ACM International Symposium on Mobile Ad Hoc*

- Networking and Computing (MobiHoc)*, Florence, Italy, May 2006, pp. 97 – 107. **(9.6% acceptance rate)**
- [C25] K. Yuen, B. Li, and B. Liang, “Distributed data gathering in multi-sink sensor networks with correlated sources,” in *Proceedings of the IFIP Networking Conference*, Coimbra, Portugal, May 2006, pp. 868 – 879, in *Springer-Verlag Lecture Notes in Computer Science*, vol. 3976. **(20% acceptance rate)**
- [C24] A. So and B. Liang, “A Lagrangian approach for the optimal placement of wireless relay nodes in wireless local area networks,” in *Proceedings of the IFIP Networking Conference*, Coimbra, Portugal, May 2006, pp. 160 – 172, in *Springer-Verlag Lecture Notes in Computer Science*, vol. 3976. **(20% acceptance rate)**
- [C23] A. H. Zahran and B. Liang, “Mobility modeling for two-tier integrated wireless multimedia networks,” in *Proceedings of the IEEE International Symposium on Multimedia (ISM), Workshop on Multimedia Technologies over Wireless Networks*, Irvine, California, December 2005.
- [C22] B. Liang and S. Drew, “Multi-user prefetching in two-tier wireless networks,” in *Proceedings of the 2nd IEEE Upstate NY Workshop on Communications and Networking*, Rochester, New York, November 2005.
- [C21] A. So and B. Liang, “Exploiting spatial diversity in rate adaptive WLANs with relay infrastructure,” in *Proceedings of the IEEE Global Telecommunications Conference (GLOBECOM)*, St. Louis, Missouri, October 2005.
- [C20] A. So and B. Liang, “An efficient algorithm for the optimal placement of wireless extension points in rectilinear WLANs,” in *Proceedings of the International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine)*, Orlando, Florida, August 2005.
- [C19] B. Liang, “Performance of multihop latency aware scheduling in delay constrained ad hoc networks,” in *Proceedings of the IEEE International Conference on Communications (ICC)*, Seoul, Korea, May 2005, pp. 3499 – 3504. (35.0% acceptance rate)
- [C18] A. H. Zahran and B. Liang, “Performance evaluation framework for vertical handoff algorithms in heterogeneous networks,” in *Proceedings of the IEEE International Conference on Communications (ICC)*, Seoul, Korea, May 2005, pp. 173 – 178. (35.0% acceptance rate)
- [C17] B. Liang, A. H. Zahran, and A. Saleh, “Application signal threshold adaptation for vertical handoff in heterogeneous wireless networks,” in *Proceedings of the IFIP Networking Conference*, Waterloo, Ontario, May 2005, pp. 1193 – 1205, in *Springer-Verlag Lecture Notes in Computer Science*, vol. 3462. **(24.7% acceptance rate; Best Paper Award)**
- [C16] M. Lotfinezhad and B. Liang, “Energy efficient clustering in sensor networks with mobile agents,” in *Proceedings of the IEEE Wireless Communications and Networking Conference (WCNC)*, New Orleans, Louisiana, March 2005, pp. 1872 – 1877. (43.2% acceptance rate)
- [C15] A. So and B. Liang, “Effect of relaying on capacity improvement in wireless local area networks,” in *Proceedings of the IEEE Wireless Communications and Networking Conference (WCNC)*, New Orleans, Louisiana, March 2005, pp. 1539 – 1544. (43.2% acceptance rate)

- [C14] J. Deng, B. Liang, and P. Varshney, "Tuning the carrier sensing range of IEEE 802.11 MAC," in *Proceedings of the IEEE Global Telecommunications Conference (GLOBECOM)*, Dallas, Texas, November 2004, pp. 2987 – 2991. (37.7% acceptance rate)
- [C13] M. Lotfinezhad and B. Liang, "Effect of partially correlated data on clustering in wireless sensor networks," in *Proceedings of the IEEE International Conference on Sensor and Ad hoc Communications and Networks (SECON)*, Santa Clara, California, October 2004, pp. 172 – 181. **(18.1% acceptance rate)**
- [C12] S. Drew and B. Liang, "Mobility-aware web prefetching over heterogeneous wireless networks," in *Proceedings of the IEEE Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, Barcelona, Spain, September 2004, pp. 687 – 691.
- [C11] J. Eshet and B. Liang, "The RRMS protocol: Fair medium access in ad hoc networks," in *Proceedings of the 22nd Biennial Symposium on Communications*, Kingston, Ontario, June 2004, pp. 162 – 164.
- [C10] S. Drew and B. Liang, "A predictive framework for web access over heterogeneous wireless networks," in *Proceedings of the 22nd Biennial Symposium on Communications*, Kingston, Ontario, June 2004, pp. 28 – 30.
- [C9] J. Li, Z. J. Haas, and B. Liang, "Performance analysis of random database group scheme for mobility management in ad hoc networks," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Anchorage, Alaska, May 2003, pp. 313 – 317. (37.5% acceptance rate)
- [C8] B. Liang and Z. J. Haas, "Optimizing route-cache lifetime in ad hoc networks," in *Proceedings of the IEEE International Conference on Computer Communication (INFOCOM)*, San Francisco, California, April 2003, pp. 281 – 291. **(20.8% acceptance rate)**
- [C7] M. R. Pearlman, J. Deng, B. Liang, and Z. J. Haas, "Elective participation in ad hoc networks based on energy consumption," in *Proceedings of the IEEE Global Telecommunications Conference (GLOBECOM)*, Taipei, Taiwan, November 2002, pp. 26 – 31. (30.6% acceptance rate)
- [C6] B. Liang and Z. J. Haas, "Minimizing the routing delay in ad hoc networks through route-cache TTL optimization," in *Proceedings of the IFIP Networking Conference*, Pisa, Italy, May 2002, pp. 1153 – 1158, poster paper, in *Springer-Verlag Lecture Notes in Computer Science*, vol. 2345.
- [C5] B. Liang and Z. J. Haas, "Virtual backbone generation and maintenance for ad hoc network mobility management," in *Proceedings of the IEEE International Conference on Computer Communication (INFOCOM)*, Tel Aviv, Israel, March 2000, pp. 1293 – 1302. **(26.1% acceptance rate)**
- [C4] Z. J. Haas and B. Liang, "Ad-hoc mobility management with randomized database groups," in *Proceedings of the IEEE International Conference on Communications (ICC)*, Vancouver, British Columbia, June 1999, pp. 1756 – 1762.
- [C3] B. Liang and Z. J. Haas, "Predictive distance-based mobility management for PCS networks," in *Proceedings of the IEEE International Conference on Computer Communication (INFOCOM)*, New York, New York, March 1999, pp. 1377 – 1384. **(30.7% acceptance rate)**

- [C2] B. Liang and S. U. Pillai, “Two-dimensional deconvolution using a robust GCD approach,” in *Proceedings of the IEEE International Conference on Image Processing (ICIP)*, Santa Barbara, CA, October 1997, pp. 424 – 427.
- [C1] B. Liang and S. U. Pillai, “Blind image deconvolution using a robust 2-D GCD approach,” in *Proceedings of the IEEE International Symposium on Circuits and Systems (ISCAS)*, Hong Kong, June 1997, pp. 1185 – 1188.

Book Chapters

- [BC2] J. Eshet and B. Liang, “Fairness and scheduling in ad hoc networks,” in *Security and Routing in Wireless Networks*, Y. Xiao, J. Li, and Y. Pan, Eds. Nova Science, 2005.
- [BC1] Z. J. Haas, J. Deng, B. Liang, P. Papadimitratos, and S. Sajama, “Wireless ad hoc networks,” in *Wiley Encyclopedia of Telecommunications*, J. Proakis, Ed. John Wiley & Sons, 2002.

INVITED PRESENTATIONS

- Deutsche Telekom Laboratories, June 2009
- Tsinghua University, June 2008
- University of Waterloo, April 2008
- Simon Fraser University, August 2007
- Argon ST – San Diego Research Center, July 2007
- University of British Columbia, October 2006.
- IEEE Communications Society Rochester Chapter, May 2005.

COURSES TAUGHT

Undergraduate			Enrollment/Instructors	University
2009 Spring	ECE361S	Computer Networks I	51/1	U of Toronto
2008 Spring	ECE302S	Probability and Random Processes	74/1	U of Toronto
2007 Fall	ECE302F	Probability and Random Processes	177/2	U of Toronto
2007 Spring	ECE302S	Probability and Random Processes	56/1	U of Toronto
2007 Spring	ECE351S	(Eng Sci) Prob. and Random Proc.	64/1	U of Toronto
2006 Spring	ECE302S	Probability and Random Processes	97/1	U of Toronto
2006 Spring	ECE351S	(Eng Sci) Prob. and Random Proc.	47/1	U of Toronto
2005 Spring	ECE351S	(Eng Sci) Prob. and Random Proc.	28/1	U of Toronto
2004 Fall	ECE190F	Discrete Mathematics	360/3	U of Toronto
2003 Fall	ECE190F	Discrete Mathematics	360/3	U of Toronto
2002 Spring	ECE 210	Introduction to Circuits (Recitation)	120/2	Cornell
Graduate			Enrollment/Instructors	University
2009 Fall	ECE1500F	Stochastic Processes	30/1	U of Toronto
2007 Fall	ECE1500F	Stochastic Processes	33/1	U of Toronto

2006 Fall	ECE1500F	Stochastic Processes	35/1	U of Toronto
2005 Fall	ECE1500F	Stochastic Processes	28/1	U of Toronto
2004 Fall	ECE1500F	Stochastic Processes	22/1	U of Toronto
2003 Fall	ECE1500F	Stochastic Processes	24/1	U of Toronto
2002 Fall	ECE1500F	Stochastic Processes	22/1	U of Toronto
2001 Fall	ECE 516	Error Control Systems	25/1	Cornell

ADVISING AND SUPERVISORSHIP

Degree/Program	Completed	In Progress
Ph.D.	4	4
M.A.Sc.	8	4
Post-doctoral fellow	2	1
Fourth-year theses	4	1
Fourth-year projects	22	7
Summer research	5	0

Graduate Theses in Progress

- Amin Farbod (Ph.D., sole-supervised)
- Yunfeng Lin (Ph.D., co-supervised with B. Li)
- Mahdi Hajiaghayi (Ph.D., co-supervised with M. Dong)
- Seyed Hossein Seyedmehdi (Ph.D., sole-supervised)
- Seyed Amir Hejazi (M.A.Sc., sole-supervised)
- Lei Hua (M.A.Sc., sole-supervised)
- Rostom Ohannessian (M.A.Sc., sole-supervised)
- Junqi Yu (M.A.Sc., co-supervised with B. Li)

Completed Graduate Theses

- Mahdi Lotfinezhad (Ph.D., co-supervised with E. Sousa)
“Stochastic Control of Time-Varying Wireless Networks,” 2009
- Sam Vakil (Ph.D., sole-supervised)
“Cooperative Communication Schemes in Wireless Networks: a Cross Layer Approach,” 2008
- Aaron So (Ph.D., sole-supervised)
“Strategic Placement of Relay Infrastructure in Wireless Networks,” 2007
- Ahmed Zahran (Ph.D., sole-supervised)
“Modeling and Design of Next-Generation Heterogeneous Wireless Networks,” 2007
- Guang Ji (M.A.Sc., sole-supervised)
“VBR Video Streaming over Wireless Networks,” 2009
- Morteza Ibrahimi (M.A.Sc., sole-supervised)
“Power Allocation in Cooperative OFDM Wireless Systems with Imperfect Implementation,” 2007

- Jonathan Lau (M.A.Sc., sole-supervised)
“Optimal Pricing for Selfish Users and Prefetching in Heterogeneous Wireless Networks,” 2007
- Guanfeng Liang (M.A.Sc., sole-supervised)
“Balancing Interruption Frequency and Buffering Penalties in VBR Video Streaming,” 2007
- Kevin Yuen (M.A.Sc., co-supervised with B. Li)
“A Distributed Framework for Correlated Data Gathering in Sensor Networks,” 2006
- Stephen Drew (M.A.Sc., sole-supervised)
“Multiuser Network-Aware Web Prefetching in Heterogeneous Wireless Networks,” 2005
- Mahdi Lotfinezhad (M.A.Sc., sole-supervised)
“Energy Efficient Clustering in Wireless Sensor Networks,” 2004
- Jacob Eshet (M.A.Sc., sole-supervised)
“Randomly Ranked Mini Slots: a Fair MAC Layer Protocol for Ad Hoc Networks,” 2004

Post-doctoral Fellows

- Atef Lotfy Abdrabou (NSERC PDF), September 2009 - present
- Mahinthan Veluppillai, October 2008 – January 2009
- Tara Small (co-supervised with B. Li), September 2005 – August 2006

Ph.D. Defense Committees Served

- Josephine Chu (ECE), “Design and Analysis of Coded Cooperation in Relay Networks,” 2009
- Xiaoyang Guan (CS), “Face Routing in Wireless Ad-hoc Networks,” 2009
- Peyman Razaghi (ECE), “Parity Forwarding for Relay Networks,” 2009
- Danilo Silva (ECE), “Error Control For Network Coding,” 2009
- Ali Tizghadam (ECE), “Autonomic Core Network Management System,” 2009
- Elzbieta Beres (ECE), “Selection in Cooperative Wireless Networks,” 2008
- Chuan Wu (ECE), “Large-Scale Peer-to-Peer Streaming: Modeling, Measurements and Optimizing Solutions,” 2008
- Petar Djukic (ECE), “Scheduling Algorithms for TDMA Wireless Multihop Networks,” 2007
- Jiang Guo (ECE), “Efficient Algorithms in Selfish Peer-to-Peer Networks: Design and Implementation,” 2007
- Ying Zhu (ECE), “High-bandwidth Data Dissemination in Overlay Networks,” 2006
- Kannan Karthik (ECE), “Methodologies for Access Control and Fingerprinting of Multimedia,” 2006
- Guangji Shi (ECE), “Phase-based Speech Processing,” 2005
- Liang Song (ECE), “Cross Layer Design in Wireless Sensor Networks,” 2005
- Zongpeng Li (ECE), “On Achieving Optimal Throughput in Data Networks,” 2005

- Do-Sung Jun (ECE), “Hierarchical Virtual Networking: Architecture and Resource Management,” 2003

Ph.D. Defense External Examiner/Appraiser

- Mehri Mehrjoo (University of Waterloo), “Resource Allocation in OFDMA Wireless Networks,” 2008
- Jun Zou (McMaster University), “Transmission Scheduling for Supporting Real-time Traffic in Wireless Mesh Networks,” 2008
- Ping Wang (University of Waterloo), “Distributed Medium Access Control for QoS Support in Wireless Networks,” 2008
- Dan Wang (Simon Fraser University), “Continuous Data Collection in Wireless Sensor Networks,” 2007

Student Design Project Award

- Department of Electrical and Computer Engineering Centennial Thesis Award, “Wireless Household Automation System,” fourth-year design project by Daniel Altin and Ian Swartz, 2008

PROFESSIONAL AND SCIENTIFIC SOCIETY MEMBERSHIPS

Senior Member of the Institute of Electrical and Electronic Engineers (IEEE)

Member of the Association for Computing Machinery (ACM)

Member of the Tau Beta Pi National Engineering Honor Society

Licensed Professional Engineer, Ontario, Canada

PROFESSIONAL SERVICES

Journal Editorship

- Editor, *IEEE Transactions on Wireless Communications*, 2008 - present
- Associate Editor, *Wiley Security and Communication Networks*, 2007 – present
- Guest Editor, Inderscience, *International Journal of Autonomous and Adaptive Communications Systems (IJAACS)*, Special Issue on Network Coding and Its Applications in Wireless Communication Systems, 2009
- Guest Editor, ACM/Springer *Mobile Networks and Applications (MONET)*, Special Issue on Ambient Media and Systems, 2008

Conference Organization

- Invited-paper session co-organizer and co-chair, Asilomar Conference on Signals, Systems, and Computers, 2008
- General Co-chair, Ambient Media and Systems (Ambi-sys), 2008
- Best Student Paper Award sub-committee, ACM International Conference on Mobile Computing and Networking (MobiCom), 2007

- Publicity Chair, Symposium on Next Generation Mobile Networks (NGMN), 2007
- Technical Vice Co-chair, IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS), 2006
- Technical Track Co-chair, International Conference on Communications Circuits and Systems (ICCCAS), 2006

Technical Program Committee Membership

- 2010
 - IEEE Conference on Computer Communications (Infocom)
 - IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)
 - IEEE Global Telecommunications Conference (Globecom)
 - IEEE International Conference on Communications (ICC)
 - IEEE International Symposium on a World of Wireless Mobile and Multimedia Networks (WoWMoM)
 - 25th Queen's Biennial Symposium on Communications (QBSC)
- 2009:
 - IEEE Conference on Computer Communications (Infocom)
 - IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)
 - IEEE International Conference on Communications (ICC)
 - International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine)
 - IEEE Canadian Conference on Electrical and Computer Engineering (CCECE)
- 2008:
 - IEEE Conference on Computer Communications (Infocom)
 - IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)
 - IFIP-TC6 Networking Conference (Networking)
 - IEEE Global Telecommunications Conference (Globecom)
 - IEEE International Conference on Communications (ICC)
 - IEEE Wireless Communications and Networking Conference (WCNC)
 - International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine)
 - 24th Queen's Biennial Symposium on Communications (QBSC)
- 2007:
 - ACM International Conference on Mobile Computing and Networking (MobiCom)
 - IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS)
 - IEEE Global Telecommunications Conference (Globecom)
 - IEEE International Conference on Communications (ICC)
 - IFIP-TC6 Networking Conference (Networking)
 - International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine)
 - International Wireless Communications and Mobile Computing Conference (IWCMC)

- IEEE Vehicular Technology Conference (VTC)
- IEEE International Conference on Advanced Information Networking and Applications (AINA)
- 2006:
 - ACM International Workshop on Performance Evaluation of Wireless Ad Hoc, Sensor, and Ubiquitous Networks (PE-WASUN)
 - IEEE International Workshop on Mobility in the Evolving Internet Architecture (MobiArch)
 - IEEE Global Telecommunications Conference (Globecom)
 - IEEE Conference on Local Computer Networks (LCN)
 - 23rd Queen's Biennial Symposium on Communications (QBSC)
 - International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine)
 - International Wireless Communications and Mobile Computing Conference (IWCMC)
- 2005:
 - IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS)
 - IEEE Global Telecommunications Conference (Globecom)
 - IEEE Conference on Local Computer Networks (LCN)
 - IEEE Wireless Communications and Networking Conference (WCNC)
 - International Conference on Wired/Wireless Internet Communications (WWIC)
- 2004:
 - International Conference on Wired/Wireless Internet Communications (WWIC)
 - Canadian Conference on Electrical and Computer Engineering (CCECE)

Reviewer for numerous IEEE, ACM, and other journals and conferences

Panelist and Referee for research funding agencies in Canada, United States, and Europe, including NSERC and NSF.

MAJOR UNIVERSITY AND DEPARTMENTAL COMMITTEES

- APSC Teaching Methods and Resources Committee, 2009 - present
- APSC Standing Committee on Community Affairs and Gender Issues, 2007 – 2009
- ECE Computer System Users Committee, 2007 – 2008
- Review Panelist for the Ontario Graduate Scholarship program, 2004 – 2007

EXTERNAL RESEARCH FUNDING

Active Grants

- “Cooperative Communication in Sensor Networks with Correlated Sources,” Electronics and Telecommunications Research Institute (ETRI) Research Contract, 2009 – 2010.

- “On Design of Next-Generation Wireless Metropolitan Area Networks with Mobile Multi-hop Relays,” NSERC Strategic Project Grant - Supplemental Competition, 2008 – 2010 (PI, with P-H. Ho and L-L. Xie).
- “Self-Reconfiguring Peer Collaboration in Wireless Communication Networks,” Ontario MRI Early Researcher Award, 2007 – 2012.
- “Cooperative Communication toward Autonomous Multihop Wireless Networking,” NSERC Discovery Grant, 2007 – 2012.

Prior Grants

- “Cooperative Broadband Mobile Networking toward IMT-Advanced,” LG Electronics Research Grant, 2008 – 2009.
- “Cooperative Source and Transmission Coding for Wireless Sensor Networks,” Electronics and Telecommunications Research Institute (ETRI) Research Contract, 2008 – 2009.
- “Multimedia Application and Service Management in Multi-Tier Heterogeneous Wireless Networks,” Bell University Laboratories Research Grant, 2005 – 2008.
- “Inter-Networking Technologies for IP Packet Switched RANs,” LG Electronics Research Grant, 2006 – 2008 (PI, with A. Leon-Garcia, B. Li, and S. Valaee).
- “Wireless and Embedded Systems Architecture Laboratory,” CFI/OIT New Opportunities Fund, 2004 – 2007 (Co-PI, with A. Brown, E. de Lara, and J. G. Steffan).
- “Advanced Networking Technologies for Next-Generation Wireless Multimedia Systems,” Sun Microsystems Equipment Donation, 2004.
- “The Planet in Blades: A Highly Condensed Infrastructure for Planet-Scale Overlay Network Implementations,” NSERC Research Tools and Instruments Grant, 2004 (Co-PI, with B. Li).
- “Mobility Management in Heterogeneous Wireless Inter-Networking,” CITO Student Internship Program, 2004 – 2006.
- “Inter-Networking Technologies for Next-Generation Wireless Multimedia Systems,” Bell University Laboratories Research Grant, 2003 – 2005.
- “Cross-Layer Design for Multimedia Communication in Mobile Ad Hoc Networks,” NSERC Discovery Grant, 2003 – 2007.