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Education

- *Stanford University*, Stanford, CA.
Doctor of Philosophy in Electrical Engineering, November, 2001.
Dissertation title: *Space-Time Signaling in Multi-Antenna Wireless Systems*
Advisor: Arogyaswami J. Paulraj
- *University of Virginia*, Charlottesville, VA.
Master of Science in Electrical Engineering, August, 1997.
Thesis title: *Mitigating Channel Distortions in Wireless Orthogonal Frequency Division Multiplexing Communication Systems*
Advisor: Georgios B. Giannakis
- *University of Virginia*, Charlottesville, VA.
Major in Electrical Engineering, May 1996.
Thesis title: *Blind Blur Identification and Perfect Image Restoration*

Current and Previous Academic Positions

- *Associate Professor, Dept. of ECE, The University of Texas, Austin, TX, 9/1/07–present* Regularly teach a variety of courses to support a research and education program in wireless communications and signal processing: *Advanced Wireless: Space-Time Communication* (graduate course), *Advanced Digital Signal Processing* (graduate course), *Digital Signal Processing* (undergraduate course), *Linear Signals and Systems* (undergraduate course), *Wireless Communications Lab* (undergraduate/graduate course).

Current research is at the intersection of communication theory, signal processing, and information theory. A primary research thrust is the advancement of MIMO communication technology in theory and practice. Founded the Wireless System Innovations Laboratory, which is part of the Wireless Networking and Communications Group.

- *Assistant Professor, Dept. of ECE, The University of Texas, Austin, TX, 12/01–8/30/07* Regularly teach a variety of courses to support a research and education program in wireless communications and signal processing: *Multi-Antenna Wireless Communication Systems* (graduate course), *Wireless Communications* (graduate course), *Advanced Digital Signal Processing* (graduate course), *Digital Signal Processing* (undergraduate course), *Wireless Communications Lab* (undergraduate course).

Current research is at the intersection of communication theory, signal processing, and information theory. A primary research thrust is the advancement of MIMO communication technology in theory and practice. Founded the Wireless System Innovations Laboratory, which is part of the Wireless Networking and Communications Group.

- *Research Assistant, School of EE, Stanford University, Stanford, CA, 9/97–8/01*

Conducted doctoral research in constellation design and space-time coding for multi-antenna wireless systems.

Other Professional Experience

- *Technical Advisory Board, Rukus Wireless Inc. (formerly Video54 Inc.), San Jose, TX, 8/05–7/07*

- *Technical Advisory Board, Quantenna, San Jose, TX, 7/08–present*

- Consultant for a variety of companies including Bandspeed, Freescale, Leapfrog Wireless, Motorola, and Rearden from 1/02 - present.

- *President and CEO, MIMO Wireless Inc, Austin, TX, 12/02–present* Consulting company that specializes in projects related to the advancement of MIMO communication technology. Projects have been performed for a variety of companies on topics from practical applications of limited feedback communication to IEEE 802.16, adaptive modulation techniques and algorithms for IEEE 802.16, remote parking enforcement, as well as technology surveys and due diligence.

- *Senior Consultant, Iospan Wireless Inc., San Jose, CA, 9/99–11/01*

Accomplished design of a MIMO (multiple-input multiple-output) antenna OFDM physical layer. Proposed framing structure and multi-rate coding scheme. Developed novel space/time/frequency link adaptation algorithms for optimizing throughput in a MIMO OFDM communication link. Designed bit-accurate algorithms for ASIC implementation.

- *Senior Systems Engineer, Iospan Wireless Inc., San Jose, CA, 9/98–9/99*

Proposed initial medium access control protocol for a broadband access systems using multi-antenna technology. Included support for spatial multiplexing with multiple substreams, transmit diversity, adaptive modulation and coding, retransmission, and multiple service flows. Developed narrowband MIMO prototype and channel measurement system. Assisted in physical layer definition, system architecture, and intellectual property development.

Honors and Awards

- Best Student Paper Award 2009 IEEE Radio and Wireless Symposium (given to my student T. Inoue)
- Grand Prize in the 2008 WinCool Demo Contest, held in conjunction with the Third International Workshop on Wireless Network Testbeds, Experimental Evaluation, and Characterization, on conjunction with ACM MobiCom 2008.

- Gold Prize in the 2007 Humantech Paper Contest (given to my student C.-B. Chae)
- Best Student Paper Award 2007 Vehicular Technology Conference Spring (given to my student R. Bhagavatula)
- 2006 Best Student Paper Award in the category of Communication Systems at *IEEE Global Telecommunications Conf.* (given to my student Kaibin Huang)
- Best Student Paper Award 2006 International Symposium on Wireless personal Multimedia Communications (given to my student Taiwen Tang)
- Best Student Paper Award 2006 Vehicular Technology Conference (given to my student A. Forenza as well as M. McKay from U. Sydney)
- 2003 Frontiers in Education New Faculty Fellow
- 1997-2000 – Fellowship: Stanford Networking Research Center (formerly Stanford Telecom Center)
- 1996 Dean’s Fellowship - Commonwealth of Virginia
- 1996 William L. Everitt Student Award for Excellence
- 1996 First place (oral session) - UVA Undergraduate Research and Design Symposium

Memberships in Professional and Honorary Societies

- Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
- Active member in four IEEE Societies: Signal Processing, Communications, Vehicular Technology, and Information Theory
- Member, American Society for Engineering Education

University Committee Assignments

- Member, Dept. of ECE, CommNetS CommNetS Faculty Search Committee, September 2005 - August 2006
- Member, Dept. of ECE Technology Steering Committee, October 2005 - Present
- Chairman, Dept. of ECE, CommNetS TA Evaluation Committee, August 2004 - January 2007
- Member, Dept. of ECE, Electromagnetics and Acoustics Area Graduate Admissions Committee, August 2002–August 2003, chaired by Prof. Hao Ling
- Member, Computational and Applied Mathematics Graduate Studies Committee, December 2002–present, chaired by Prof. Todd Arbogast
- Member, Wireless Networking and Communications Group Steering Committee, August 2002–present, chaired by Prof. Ted S. Rappaport

- Member, Dept. of ECE, Subcommittee for TxTEC Undergraduate Scholarship and Graduate Fellowship Awards, August 2002–present, chaired by Prof. Ed Powers
- Member, Dept. of ECE, Graduate Studies Committee, December 2001–present, chaired by Prof. Dean Neikirk
- Member, Dept. of ECE, Communications, Networks, and Systems (CommNetS) Area Graduate Admissions Committee, December 2001–December 2006, chaired by Prof. Brian L. Evans
- Chairman, Dept. of ECE, Communications, Networks, and Systems (CommNetS) Area Graduate Admissions Committee, January 2007 – present
- Member, Dept. of ECE, Communications, Networks, and Systems (CommNetS) Faculty Committee, December 2001–present, chaired by Prof. Edward J. Powers
- Member, Dept. of ECE, Communications, Networks, and Systems (CommNetS) Curriculum Committee, December 2001–present, chaired by Prof. Ross Baldick

Professional Activities

Outside Committee Assignments

- Technical Program Committee, 2010, IEEE GLOBECOM, Communication Theory Symposium, *IEEE Global Telecommunications Conf.*
- Technical Program Committee, 2010, IEEE International Conference on Communications, Communication Theory Symposium, *IEEE Int. Conf. on Communications.*
- Technical Program Committee, 2010, IEEE International Workshop on Cognitive Information Processing.
- Technical Program Committee, 2009, Vehicular Technology Conference Spring.
- Technical Program Committee, 2009, International Workshop on Computational Advances in Multi-Sensor Adaptive Processing.
- Technical Program Committee, 2009, IEEE International Workshop on Cross-Layer Designs IEEE IWCLD 2009.
- Technical Program Committee, 2008, IEEE GLOBECOM, Communication Theory Symposium, *IEEE Global Telecommunications Conf.*
- Third ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation and Characterization (WiNTECH 2008).
- Technical Program Committee, 2008, IEEE Workshop on Signal Processing Advances in Wireless Communications.
- Technical Program Committee, 2008, IEEE International Conference on Communications, Communication Theory Symposium, *IEEE Int. Conf. on Communications.*

- Technical Program Committee, 2007, IEEE Workshop on Signal Processing Advances in Wireless Communications, *IEEE Int. Workshop on Signal Processing Advances in Wireless Communication*.
- Technical Program Committee, 2007, International Conference on Acoustics, Speech, and Signal Processing.
- Technical Program Committee, 2007, IEEE Statistical Signal Processing Workshop.
- Technical Program Committee, 2007, IEEE GLOBECOM, Communication Theory Symposium, *IEEE Global Telecommunications Conf.*.
- Technical Program Committee, 2007, 15th Annual Workshop on Adaptive Sensor Array Processing (ASAP).
- Technical Program Committee, 2007, SECON.
- Technical Program Committee, 2007, IEEE International Conference on Communications, Communication Theory Symposium, *IEEE Int. Conf. on Communications*.
- Technical Program Committee, 2006, GLOBECOM, Communication Theory Symposium, *IEEE Global Telecommunications Conf.*.
- Technical Program Committee, 2006, International Wireless Communications and Mobile Computing Conference.
- Technical Program Committee, 2006, International Conference on Acoustics, Speech, and Signal Processing.
- Technical Program Committee, 2006, Symposium on Wireless Personal Multimedia Communications.
- Technical Program Committee, 2006, IEEE Workshop on Signal Processing Advances in Wireless Communications, *IEEE Int. Workshop on Signal Processing Advances in Wireless Communication*.
- Technical Program Committee, 2006, International Workshop on Wireless Ad Hoc & Sensor Networks.
- Technical Program Committee, 2006, Vehicular Technology Conference Spring.
- Technical Program Committee, 2006, International Symposium on Wireless Communication Systems.
- Technical Program Committee, 2006, 14th Annual Workshop on Adaptive Sensor Array Processing (ASAP).
- Technical Program Committee, 2006, Communication Theory Symposium, *IEEE Int. Conf. on Communications*

- Technical Program Committee, 2005, *IEEE Int. Symp. on Personal Indoor and Mobile Radio Comm.* .
- Technical Program Committee, 2005, Information Theory Symposium, WIRELESS-COM 2005.
- Technical Program Committee, 2005, ACM Workshop on experimental approaches to wireless network design and analysis E-WIND.
- Member, 2005-2007, Signal Processing for Communications Technical Committee, IEEE Signal Processing Society.
- Technical Program Committee, 2005, Wireless Communications Symposium, *IEEE Int. Conf. on Communications*
- Technical Program Committee, 2005, Wireless Networking and Communications Conference, *IEEE Wireless Communications and Networking Conf.*.
- Publicity Co-Chair, 2005, IEEE Workshop on Signal Processing Advances in Wireless Communications, *IEEE Int. Workshop on Signal Processing Advances in Wireless Communication.*
- Technical Program Committee, 2004, Communication Theory Symposium, *IEEE Int. Conf. on Communications*
- Technical Program Committee, 2004, Communication Theory Symposium, *IEEE Global Telecommunications Conf.*
- Subcommittee Chair, 2004, MIMO Technologies, 2004 Radio and Wireless Communications Conference (RAWCON), September 19-22, 2004.
- Technical Program Committee, 2004, Information Theory Workshop, 2004 IEEE Information Theory Workshop.
- Technical Program Committee, 2003, *IEEE Sarnoff Symposium - Advances In Wired And Wireless Communications*
- Technical Program Committee, 2002, Communication Theory Symposium, *IEEE Global Telecommunications Conf.*

IEEE Positions

- Member IEEE Signal Processing for Communications and Networking Technical Committee (TC), 2006 - 2011
- Vice Chair IEEE Communication Theory Technical Committee, 2009 - present [member since 2002]

Editing Positions

- Editor for the IEEE Transactions on Communications, 2004 - 2007.
- Associate Editor for the IEEE Transactions on Vehicular Technology, 2003 - 2006.

Other Activities

- Reviewer for the following journals:
 - *EURASIP Journal of Applied Signal Processing* (2004–present)
 - *EURASIP Journal of Wireless Communication Networks* (2004–present)
 - *ETRI Journal - Information, Telecommunications, and Electronics* (2004–present)
 - *IEEE Transactions on Antennas and Propagation* (2003–present)
 - *IEEE Communications Letters* (2000–present)
 - *IEEE Transactions on Biomedical Engineering* (2001–present)
 - *IEEE Transactions on Communication* (1999–present)
 - *IEEE Signal Processing Letters* (1999, 2002 - present)
 - *IEEE Transactions on Information Theory* (2003–present)
 - *IEEE Transactions on Image Processing* (1997-1999,2002-present)
 - *IEEE Transactions on Mobile Computing* (2005-present)
 - *IEEE Transactions on Signal Processing* (1997–present)
 - *IEEE Transactions on Vehicular Technology* (2001–present)
 - *Journal of Communications and Networks (JCN)* (2003–present)
- Reviewer for the following conferences:
 - *2007 IEEE Workshop on Smart Antennas*
 - *2006 IEEE International Workshop on Wireless Ad-hoc and Sensor Networks*
 - *2005 - present IEEE Int. Conf. on Acoustics, Speech, and Signal Proc.*
 - *2004 - 2005 IEEE Radio and Wireless Communications Conference*
 - *2004 IEEE Int. Sym. on Spread Spectrum Techniques and Applications*
 - *2003 - present IEEE Vehicular Tech. Conf.*
 - *2003, 2005 Sarnoff Symposium*
 - *2002 IEEE Workshop on Signal Processing Systems*
 - *2002 - present IEEE Global Telecommunications Conf.*
 - *2002 - present IEEE Int. Conf. on Communications*
 - *2002 - present IEEE Wireless Communications and Networking Conf.*
 - *2002 - present IEEE Vehicular Tech. Conf.*
- Guest edited the following special issues:

- EURASIP Journal on Advances in Signal Processing, *Special Issue on Multiuser MIMO Transmission with Limited Feedback, Cooperation, and Coordination*. Published 2009.
 - *IEEE Journal on Sel. Areas in Comm., Special Issue on Exploiting Limited Feedback in Tomorrow's Wireless Communication Networks*. Published October 2008.
 - EURASIP Journal on Wireless Communications and Networking Special Issue on *Smart Antennas*. Published in 2007.
 - Wiley's Wireless Communications and Mobile Computing, Special Issue on *Multiple-Input Multiple-Output (MIMO) Communications*, Volume 4 Issue 7 - November 2004.
- Chaired the following conference sessions:
 - “Multiuser MIMO,” *2009 Communication Theory Workshop*, May 11-13, 2009
 - “10B: Coding II,” *2009 Vehicular Technology Conference*, April 26-29, 2009
 - “Machine learning IV,” *2009 Information Theory and Applications*, Feb. 8-13, 2009
 - “9A: Transmission Technologies,” *2007 Vehicular Technology Conference*, April 22-25, 2007
 - “7F: MIMO Antennas,” *2007 Vehicular Technology Conference*, April 22-25, 2007
 - “SPCOM-L5.1” *2007 International Conference on Acoustics, Speech, and Signal Processing*, April 15-20, 2007
 - “2E: MIMO 2: OFDM,” *2006 Vehicular Technology Conference*, May 7-10, 2006
 - “MP7 MIMO Feedback Communications,” *2005 Asilomar Conference on Signals, Systems, and Computers*, Oct. 30 - Nov. 2, 2005
 - “CT16: Space-Time Coding,” *2004 IEEE Global Communications Conference*, Nov. 29 - Dec. 3, 2004
 - “Track 3: Array Processing and MIMO,” *2004 Thirty-Eighth Asilomar Conference on Signals, Systems, and Computers*, Nov. 7 - 10, 2004
 - “Emerging Wireless Systems,” *2004 IEEE Information Theory Workshop*, Oct. 24-29, 2004
 - “MIMO Systems,” *2004 2nd Annual Wireless Networking and Communications Group Symposium*, Oct. 21-23, 2004
 - “MIMO Communication: RF and Calibration Issues,” *2004 IEEE Radio and Wireless Conference*, Sept. 19-22, 2004
 - “Sequences II,” *2004 Eighth IEEE International Symposium on Spread Spectrum Techniques and Applications*, August 30 - September 2, 2004
 - “CT07: MIMO I,” *2004 International Conference on Communications*, June 20-24, 2004
 - “MIMO 6,” *2004 Vehicular Technology Conference*, May 17 - 19, 2004

- “U084 - Adaptive Protocols for Wireless Networks - II,” *2003 MILCOM* 2003, October 13-16, 2003
- “CTS-03 Space-Time Coding and MIMO Systems (I) (Code Construction)” *2002 IEEE Globecom* November 17-21, 2002
- “Session II.F Space Time Processing,” *2002 Fortieth Annual Allerton Conference on Communication, Control, and Computing* October 2 - 4, 2002
- “Broadband Access,” *1999 5th Annual Smart Antennas Workshop*
- Served on the following invited panels:
 - “The PHY Layer is Dead,” *IEEE Vehicular Tech. Conf.* , Barcelona, Spain April 26 - 29, 2009.
 - “Panel Discussion: What is the Future for 3G?,” *iMobicon* 2005, Jeju, South Korea, November 29, 2005.
 - “Assistant Faculty Panel,” The University of Texas at Austin American Society for Engineering Education (UT ASEE), April 7, 2003.
- On organizing committee for the following workshops:
 - Third International Workshop on Computational Advances in Multi-Sensor Adaptive Processing, Aruba, Dutch Antilles, Dec. 13-16, 2009. (local arrangements co-chair)
 - *IEEE Asilomar Conf. on Signals, Systems, and Computers*, Pacific Grove, CA, Oct. 26-29, 2008.
 - *IEEE Asilomar Conf. on Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 4-7, 2007.
- Organized the following invited sessions at conferences:
 - “Multiuser MIMO,” *IEEE Communication Theory Workshop*, Napa, CA, USA, May 10-13, 2009.
- Organized the following workshops:
 - “MIMO Communication: Introduction and Recent Advances,” *2003 2003 Radio and Wireless Communications Conference (RAWCON)*, August 10-13, 2003.
- Technical Program Chair for the following conferences:
 - 2010 International Symposium on Information Theory (co-chair).
 - *IEEE Int. Workshop on Signal Processing Advances in Wireless Communication*, Perugia, Italy, June 21-24, 2009 (co-chair).
 - 2007 Fall Vehicular Technology Conference (co-chair).
 - 2005 Fall Vehicular Technology Conference - DSP for wireless Applications track (co-chair).

- First Annual Wireless Networking and Communications Group Symposium, Austin, Texas, 2003.
- General Program Chair for the following conferences:
 - *IEEE Int. Workshop on Signal Processing Advances in Wireless Communication*, Perugia, Italy, June 21-24, 2009 (co-chair).
 - IEEE Communication Theory Workshop, St. Croix, USVI, May 11-14, 2008.
 - Second Annual Wireless Networking and Communications Group Symposium, Austin, Texas, 2004.
- Organized the following conferences/workshops:
 - IEEE Communication Theory Workshop, St. Croix, USVI, May 11-14, 2008.
 - IEEE Signal Processing for Wireless Communications Workshop, Perugia, Italy, June 21-24, 2009. (co-organizer)

Publications

Refereed Journal Articles (Articles are sorted by the key topic and appear only once)

Limited Feedback Strategies for MIMO Systems

1. C. B. Chae, Insoo Hwang, R. W. Heath, Jr., and V. Tarokh, “Interference Aware-Coordinated Beamforming System in a Two-Cell Environment” submitted to *IEEE Journal on Sel. Areas in Comm.*, Special Issue on Cooperative Communications in Cellular Networks.
2. T. Inoue and R. W. Heath, Jr., “Predictive Coding on the Grassmann Manifold” submitted to the *IEEE Trans. on Signal Processing*, August 2009.
3. J. Sánchez-García, L. Soriano-Equigua, and R. W. Heath, Jr., “Quantized Antenna Combining for Multiuser MIMO-OFDM with Limited Feedback,” to appear in *IEEE Signal Processing Letters*.
4. R. W. Heath, Jr., T. Wu, and A. C. K. Soong, “Progressive Refinement for High Resolution Limited Feedback Beamforming,” *EURASIP Journal on Advances in Signal Processing*, special issue on Multiuser Limited Feedback, vol. 2009, Article ID 463823, 13 pages, doi:10.1155/2009/463823, 2009.
5. J. Zhang, R. W. Heath, Jr., M. Kountouris, and J. G. Andrews, “Mode Switching for the MIMO Broadcast Channel Based on Delay and Channel Quantization,” *EURASIP Journal on Advances in Signal Processing*, special issue on Multiuser Limited Feedback, vol. 2009, Article ID 802548, 15 pages, doi:10.1155/2009/802548, 2009.
6. K. Huang, R. W. Heath, Jr., and J. G. Andrews, “Limited Feedback Beamforming Over Temporally-Correlated Channels,” *IEEE Trans. on Signal Processing*, vol. 57, no. 5, pp. 1959-1975, May 2009. Older version available on ArXiv.

7. A. Y. Panah, R. G. Vaughan, and R. W. Heath, Jr., "Optimizing Pilot Locations Using Feedback in OFDM Systems" *IEEE Trans. on Veh. Tech.*, vol. 58, no. 6, pp. 2803-2814, July 2009.
8. D. J. Ryan, I. B. Collings, I. V. L. Clarkson, and R. W. Heath, Jr., "Performance of Vector Perturbation Multiuser MIMO Systems with Limited Feedback" to appear in *IEEE Trans. on Communications*.
9. D. J. Love, R. W. Heath, Jr., V. K. N. Lau, D. Gesbert, B. D. Rao, and M. Andrews, "An Overview of Limited Feedback in Wireless Communication Systems," *IEEE Journal on Sel. Areas in Comm.*, Special Issue on Exploiting Limited Feedback in Tomorrow's Wireless Communication Networks, vol. 26, no. 8, pp. 1341-1365, Oct. 2008.
10. R. W. Heath, Jr., D. J. Love, V. K. N. Lau, D. Gesbert, B. D. Rao, and M. Andrews, "Exploiting Limited Feedback in Tomorrow's Wireless Communication Networks," *IEEE Journal on Sel. Areas in Comm.*, Special Issue on Exploiting Limited Feedback in Tomorrow's Wireless Communication Networks, vol. 26, no. 8, pp. 1337-1340, Oct. 2008. (editorial for special issue)
11. C. B. Chae, D. Mazzaresse, N. Jindal and R. W. Heath, Jr., "Coordinated Beamforming with Limited Feedback in the MIMO Broadcast Channel" *IEEE Journal on Sel. Areas in Comm.*, Special Issue on Exploiting Limited Feedback in Tomorrow's Wireless Communication Networks, vol. 26, no. 8, pp. 1505-1515, Oct. 2008.
12. T. Inoue and R. W. Heath, Jr., "Kerdock Codes for Limited Feedback Precoded MIMO Systems" *IEEE Trans. on Signal Processing*, vol. 57, no. 9, pp. 3711-3716, September 2009. Prior draft available at ArXiv.
13. K. Huang, R. W. Heath, Jr., and J. G. Andrews, "Uplink SDMA with Limited Feedback: Throughput Scaling," *EURASIP Journal on Advances in Signal Processing*, special issue on Limited Feedback, vol. 2008, Article ID 479357, 17 pages, doi:10.1155/2008/479357, 2008.
14. B. Mondal and R. W. Heath, Jr., "A Diversity Guarantee and SNR Performance for Quantized Precoded MIMO Systems," *EURASIP Journal on Advances in Signal Processing*, special issue on Limited Feedback, vol. 2008, Article ID 594928, 15 pages, doi:10.1155/2008/594928, 2008.
15. K. Huang, R. W. Heath, Jr., and J. G. Andrews, "Space Division Multiple Access with a Sum Feedback Rate Constraint," *IEEE Trans. on Signal Processing*, vol. 55, no. 7, part 2, pp. 3879-3891, July 2007. See also the earlier version on ArXiv.
16. V. Raghavan, R. W. Heath, Jr., and A. Sayeed, "Systematic Codebook Designs for Quantized Beamforming in Correlated MIMO Channels," *IEEE Journal on Sel. Areas in Comm.*, Special Issue on Optimization of MIMO Transceivers for Realistic Communication Networks: Challenges and Opportunities, vol. 25, no. 7, pp. 1298-1310, Sept. 2007.

17. K. Huang, J. G. Andrews, and R. W. Heath, Jr., "Performance of Orthogonal Beamforming for SDMA with Limited Feedback," *IEEE Trans. on Veh. Tech.*, vol. 57, no. 5, pp. 1959-1975, May 2009. Earlier version at at ArXiv.
18. B. Mondal, S. Dutta, and R. W. Heath, Jr., "Quantization on the Grassmann Manifold," *IEEE Trans. on Signal Processing*, vol. 55, no. 8, pp. 4208-4216, Aug. 2007.
19. B. Mondal and R. W. Heath, Jr., "Performance Analysis of Quantized Beamforming MIMO Systems," *IEEE Trans. on Signal Processing*, vol. 54, no. 12, pp. 4753-4766, December 2006.
20. N. Khaled, B. Mondal, R. W. Heath, Jr., G. Leus, and F. Petre, "Interpolation-Based Multi-Mode Precoding for MIMO-OFDM Systems with Limited Feedback," *IEEE Trans. on Wireless*, vol. 6., no. 3, pp. 1003-1013, March 2007.
21. J. Choi, B. Mondal, and R. W. Heath, Jr., "Interpolation Based Unitary Precoding for Spatial Multiplexing MIMO-OFDM with Limited Feedback," *IEEE Trans. on Signal Processing*, vol. 54, no. 12, pp. 4730-4740, December 2006.
22. B. Mondal and R. W. Heath, Jr., "Channel Adaptive Quantization for Limited Feedback MIMO Beamforming systems," *IEEE Trans. on Signal Processing*, vol. 54, no. 12., pp. 4741-4740, December 2006.
23. D. J. Love and R. W. Heath, Jr., "Limited Feedback Diversity Techniques for Correlated Channels," *IEEE Trans. on Veh. Tech.*, vol. 55, no. 2, pp. 718-722, March 2006.
24. J. Choi and R. W. Heath, Jr., "Interpolation Based Transmit Beamforming for MIMO-OFDM with Limited Feedback," *IEEE Trans. on Signal Processing*, vol. 53, no. 11, pp. 4125-4135, Nov. 2005.
25. D. J. Love and R. W. Heath, Jr., "Multimode Precoding for MIMO Wireless Systems," *IEEE Trans. on Signal Processing*, vol. 53, no. 10, part 1, pp. 3674 - 3687, October 2005.
26. D. J. Love and R. W. Heath, Jr., "OFDM Power Loading using Limited Feedback," *IEEE Trans. on Veh. Tech.*, vol. 54, no. 5, pp. 1773-1780, September 2005.
27. R. W. Heath, Jr. and D. J. Love, "Multi-Mode Antenna Selection for Spatial Multiplexing with Linear Receivers," *IEEE Trans. on Signal Processing*, vol. 53, no. 8, part 2, pp. 3042-3056, August 2005.
28. D. J. Love and R. W. Heath, Jr., "Limited Feedback Unitary Precoding for Spatial Multiplexing," *IEEE Trans. on Info. Theory*, vol. 51, no. 8, pp. 2967 - 2976, August 2005.

29. R. W. Heath, Jr. and A. J. Paulraj, "Switching Between Diversity and Multiplexing in MIMO Systems," *IEEE Trans. on Communications*, vol. 53, no. 6, pp. 962-968, June 2005.
30. D. J. Love and R. W. Heath, Jr., "Limited Feedback Unitary Precoding for Orthogonal Space-time Block Codes," *IEEE Trans. on Signal Processing*, vol. 53, no. 1, pp. 64-73, January 2005.
31. D. J. Love and R. W. Heath, Jr., "Necessary and Sufficient Conditions for Full Diversity Order in Correlated Rayleigh Fading Beamforming and Combining Systems," *IEEE Trans. on Wireless*, vol. 4, no. 1, pp. 20-23, Jan. 2005.
32. D. J. Love and R. W. Heath, Jr., "Diversity Performance of Precoded Orthogonal Space-Time Block Codes Using Limited Feedback", *IEEE Communication Letters*, vol. 8, pp. 305-307, May 2004.
33. D. J. Love, R. W. Heath, Jr., W. Santipach, and M. L. Honig, "What is the Value of Limited Feedback for MIMO Channels?," *IEEE Communications Magazine*, vol. 42, no. 10, pp. 54-59, Oct. 2003.
34. D. J. Love, R. W. Heath, Jr., and T. Strohmer, "Grassmannian Beamforming for Multiple-Input Multiple-Output Wireless Systems," *IEEE Trans. on Info. Theory* special issue on MIMO Communication, vol. 49, pp. 2735-2747, Oct. 2003.

Antenna Selection and Other Transmit Strategies in MIMO Systems

35. C. B. Chae, S. Shim, R. W. Heath, Jr., and S. R. Yun, "Space-Time Block Codes with Limited Feedback Using Antenna Grouping," *IEICE Trans. Commun.*, vol. E91-B, no. 10, pp. 3387-3390, Oct. 2008.
36. Z. Shen, R. W. Heath, Jr., J. G. Andrews, and B. L. Evans, "Space-Time Water-Filling for Composite MIMO Fading Channels", *EURASIP Journal on Wireless Communications and Networking*, special issue on Radio Resource Management in 3G+ Systems, vol. 2006, special issue no. 6, 8 pages, Article Id 16281, May 2006.
37. D. J. Love and R. W. Heath, Jr., "Equal Gain Transmission in Multiple-Input Multiple-Output Wireless Systems," *IEEE Trans. on Communications*, vol. 51, pp. 1102-1110, July 2003.
38. D. A. Gore, R. W. Heath, Jr., and A. J. Paulraj, "Transmit Selection in Spatial Multiplexing Systems," *IEEE Communication Letters*, vol. 6, no. 11, pp. 491-493, November 2002.
39. R. W. Heath, Jr., S. Sandhu, and A. J. Paulraj "Antenna selection for spatial multiplexing systems with linear receivers, *IEEE Communication Letters*, vol. 5, no. 4, pp. 142-144, April 2001.

Network MIMO / Multi-Base Cooperation / MIMO Interference Channels

40. O. El Ayach, S. W. Peters, and R. W. Heath, Jr., "A Study of the Practicality of Interference Alignment Using MIMO-OFDM Channel Measurements", submitted to the *IEEE Trans. on Veh. Tech.*, November 2009.
41. C. B. Chae, S. Kim, and R. W. Heath, Jr., "Network Coordinated Beamforming for Cell-boundary Users: Linear and Non-linear Approaches" to appear in *IEEE Journal on Sel. Topics in Sig. Proc.*.
42. J. Zhang, J. G. Andrews, A. Ghosh, and R. W. Heath, Jr., "Networked MIMO with Clustered Linear Precoding," *IEEE Trans. on Wireless* vol. 8, no. 4, pp. 1910-1921, April 2009.

Multi-User MIMO Communication

43. J. Zhang, R. W. Heath, Jr., M. Kountouris, and J. G. Andrews, "Multi-mode Transmission for the MIMO Broadcast Channel with Imperfect Channel State Information," submitted to *IEEE Trans. on Wireless*, March 2009.
44. C. B. Chae and R. W. Heath, Jr., "On the Optimality of Linear Multiuser MIMO Beamforming with Many Receive Antennas," *IEEE Signal Processing Letters*, vol. 16, no. 2, pp. 117-120, Feb. 2009.
45. C. Lee, C. B. Chae, S. Vishwanath, and R. W. Heath, Jr., "Adaptive Mode Switching in Correlated Multiple Antenna Cellular Networks" *Journal of Communications and Networks*, Special Issue on Wireless Cooperative Transmission and Its Applications, vol. 11, no. 3, pp. 279-286, June 2009.
46. C. B. Chae, D. Mazzaresse, T. Inoue and R. W. Heath, Jr., "Coordinated Beamforming for the Multiuser MIMO Broadcast Channel with Limited Feedforward," *IEEE Trans. on Signal Processing*, vol. 56, no. 12, pp. 6044-6056, Dec. 2008.
47. C. B. Chae, S. Shim, and R. W. Heath, Jr., "Block Diagonalized Vector Perturbation for Multi-user MIMO Systems," *IEEE Trans. on Wireless*, vol. 7, no. 11, pp. 4051-4057, Nov. 2008.
48. Seijoon Shim, Jin Sam Kwak, R. W. Heath, Jr., J. G. Andrews, "Block Diagonalization for Multi-User MIMO with Other-Cell Interference," *IEEE Trans. on Wireless*, vol. 7, no. 7, pp. 2671-2681, July 2008.
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Standards Contributions

1. R. Daniels and R. W. Heath, Jr., "Multi-band Modulation, Coding, and Medium Access Control," contribution to VHT IEEE 802.11 Study Group, Atlanta, GA, November 12, 2007.
2. V. Erceg, L. Schumacher, P. Kyritsi, A. Molisch, D. S. Baum, A. Y. Gorokhov, C. Oestges, Q. Li, K. Yu, N. Tal, B. Dijkstra, A. Jagannatham, C. Lanzl, V. J. Rhodes, J. Medbo, D. Michelson, M. Webster, E. Jacobsen, D. Cheung, C. Prettie, M. Ho, S. Howard, B. Bjerke, L. Jengx, H. Sampath, S. Catreux, S. Valle, A. Poloni, A. Forenza, and R. W. Heath, Jr., TGN Channel Models, IEEE 802.11-03/940r4, 2004.
3. R. W. Heath, Jr., J. Chiang, B. Mondal, and R. Samanta, "11n Partial Proposal: Quantized Precoding with Feedback," IEEE 802.11-04/962r1 and 04/1003r1, Berlin, Germany, September 2004.
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Other Major Publications

1. None

Books and Book Chapters

1. M. F. Sabir, R. W. Heath, Jr., and A. C. Bovik, "Joint source-channel coding for image and video communication," *The Encyclopedia of Wireless and Mobile Communications*, B. Furht (Eds.), New York: Auerbach Publications, December 2007.
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5. D. J. Love and R. W. Heath, Jr., "Feedback Techniques for Wireless Channels," *MIMO System Technology for Wireless Communications*, pp. 113-146, G. Tsoulos (Eds.), Boca Raton, FL: CRC Press, 2006.
6. R. W. Heath, Jr., A. Salvekar, and W. Bard, "Digital Communication," *The Handbook on Information Security*, vol. 1, 415-427, pp. H. Bidgoli (Eds.), Hoboken, NJ: John Wiley & Sons, Inc. 2005.
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Technical Reports

1. I. Dhillon, R. W. Heath, Jr., M. Sustik, and J. A. Tropp "Generalized finite algorithms for constructing Hermitian matrices with prescribed diagonal and spectrum", UT CS Technical Report # TR-03-49, Nov., 2003.
2. R. W. Heath, Jr. and D. J. Love, "Multi-Mode Antenna Selection for Spatial Multiplexing with Linear Receivers," Wireless Networking and Communications Group Technical report # WNCG-TR-2003-05-07, May 2003.

Oral Presentations

1. October 2, 2009, "Transmission Capacity Analysis of Multiple Antennas Ad-Hoc Networks," (invited) delivered to Purdue School of Electrical and Computer Engineering, West Lafayette, Indiana.
2. July 30, 2009, "Progressive Feedback for High Resolution Limited Feedback in MIMO Systems," (invited) delivered to Supélec, Paris, France.
3. July 22, 2009, "Introduction to ITMANET and Nequit & Recent Results on Capacity of Ad Hoc Networks with Multiple Antennas," (invited) delivered to Foundations and Methodologies for Future Communication and Sensor Networks - COMONSENS, Santander, Spain.
4. June 30, 2009 "How to Use Multiple Antennas in an Ad-Hoc Network," (invited) delivered to University of Málaga, Málaga, Spain.
5. April 29, 2009, "MIMO Spatial Mode Adaptation at the Cell Edge Using Interferer Spatial Correlation," (invited) delivered to *IEEE Vehicular Tech. Conf.*, Barcelona, Spain.
6. March 5, 2009, "Interference Alignment: Algorithms and Performance in Realistic Channels", DARPA ITMANET Workshop, Stanford, CA, USA.

7. March 4, 2009, “Reinventing MIMO for High-Bandwidth Communication in Interference-Limited Cellular Systems: Year 2 ” delivered to the Semiconductor Research Corporation, Stanford, CA, USA.
8. February 27, 2009, “Multiuser MIMO Transmission with Coordinated Beamforming,” (invited) delivered Sharp Labs, Oregon, USA.
9. January 15, 2009, “Multiuser MIMO Transmission with Coordinated Beamforming,” (invited) delivered to the Electrical & Computer Engineering Department, University of Alberta, Canada.
10. December 10, 2008, “Progressive Feedback for High Resolution Limited Feedback in MIMO Systems,” (invited) delivered to the 2nd Huawei Wireless Symposium, Shanghai, China.
11. October 30, 2008, “MIMO Perspectives,” (invited keynote) CERDEC S & TCD MIMO Technology Day, USA (invited).
12. October 30, 2008, “Machine Learning for Physical Layer Link Adaptation in Multiple-Antenna Wireless Networks,” (invited) CERDEC S&TCD MIMO Technology Day, USA (invited).
13. October 27, 2008, “Spatial Interference Cancellation for Mobile Ad Hoc Networks: Imperfect CSI,” (invited) *IEEE Asilomar Conf. on Signals, Systems, and Computers*, Pacific Grove, CA, USA (invited).
14. October 27, 2008, “Progressive Refinement for High Resolution Limited Feedback Multiuser MIMO Beamforming,” *IEEE Asilomar Conf. on Signals, Systems, and Computers*, Pacific Grove, CA, USA (invited).
15. October 17, 2008, “Mobility Adaptation in MIMO Links,” delivered to Huawei, Dallas, Texas (invited).
16. September 12, 2008, “ITMANET Nequ-IT: Overhead/Feedback Thrust Summary,” the DARPA ITMANET Workshop, Washington D.C. USA.
17. July 9, 2008, “Communication and Signal Processing on the Grassmann Manifold,” 9th IEEE Workshop on Signal Processing for Wireless Communications (invited, Research Plenary).
18. May 12, 2008, “Limited Feedback Beamforming with Delay: Theory and Practice,” 2008 IEEE Communication Theory Workshop, Park City, St. Croix, U.S. Virgin Islands (invited).
19. March 30, 2008 , “Tutorial: Adaptive MIMO Techniques and Performance: Part I, IV” tutorial delivered to delivered to *IEEE Int. Conf. on Acoustics, Speech, and Signal Proc.*, Las Vegas, Nevada, USA.

20. March 12, 2008, "Cooperative Communication for Future Wireless Cellular Networks, Research Directions, & WSIL Research Review," delivered to Texas Instruments Inc., Dallas, TX.
21. March 11, 2008, "Reinventing MIMO for High-Bandwidth Communication in Interference-Limited Cellular Systems," delivered to Semiconductor Research Corporation, Dallas, TX.
22. January 28, 2008, "Maximizing Reliability in Multi-hop Wireless Networks with Cascaded Space-time Codes," (invited) delivered at Information Theory and Applications, San Diego, California (invited).
23. January 5, 2008, "A New Analytical MIMO Channel Model Including Diversity, Orientation and Depolarization effects," (invited) delivered at URSI National Radio Science Meeting Boulder, Colorado.
24. December 15, 2007, "Summary of Progress and Hot Topics in Cooperative MIMO," delivered to the Huawei, Dallas, Texas (invited).
25. October 19, 2007, "Cooperative Communication for Future Wireless Cellular Networks: Antennas, Antennas, Antennas," delivered at Texas Wireless Summit, Austin, Texas (invited, Research Plenary).
26. August 30, 2007, "Limited Feedback Beamforming with Delay: Theory and Practice," delivered at Yonsei University, Seoul, Korea (invited).
27. August 30, 2007, "Limited Feedback Beamforming with Delay: Theory and Practice," delivered at Seoul National University, Seoul, Korea (invited).
28. May 30-31, 2007, "State-of-the-art in MIMO Communication and Advanced Topics," (2 day short course) delivered to the Huawei, Dallas, Texas (invited).
29. May 24, 2007, "Cooperative Communications for Future Wireless Cellular Networks," delivered to Nortel Networks, Ottawa, Canada (invited).
30. April 25, 2007, "Opportunistic Relay Selection with Limited Feedback," delivered to *IEEE Vehicular Tech. Conf.*, Dublin, Ireland.
31. April 25, 2007, "Early Results on Hydra: A Flexible MAC/PHY Multihop Testbed," delivered to *IEEE Vehicular Tech. Conf.*, Dublin, Ireland.
32. April 22, 2007, "Tutorial: Adaptive MIMO Techniques and Performance: Part I,IV," delivered to *IEEE Vehicular Tech. Conf.*, Dublin, Ireland.
33. April 20, 2007, "Low-Complexity User and Antenna Selection for Multiuser MIMO Systems with Block Diagonalization," (poster) delivered to *IEEE Int. Conf. on Acoustics, Speech, and Signal Proc.*, Honolulu, Hawaii.
34. January 25, 2007, "Feedback in MANETs & the Hydra Prototype," delivered to the DARPA ITMANET Workshop.

35. December 11, 2006, "Cooperative Communication for Future Wireless Cellular Networks," delivered to Freescale, Austin, Texas (invited).
36. December 1, 2006, "Tutorial: Adaptive MIMO Techniques and Performance: Part I," tutorial delivered to IEEE GLOBECOM, San Francisco, California, USA.
37. November 16, 2006, "Multi-Antenna Limited Feedback for Temporally Correlated Channels," delivered to Freescale, Austin, Texas (invited).
38. October 23, 2006, "Impact of MIMO Communication on Antenna Design," Keynote Address delivered to the 2006 Antenna Measurement Techniques Association Conference in Austin, Texas (invited).
39. September 20, 2006, "Opportunistic Feedback in Clustered OFDM Systems," delivered to the International Symposium on Wireless personal Multimedia Communications, San Diego, CA.
40. September 1, 2006, "Cooperative Communications for Future Wireless Cellular Networks," delivered to the Samsung 4G Forum, Jeju, South Korea (invited).
41. August 24, 25, 29, 30, "Overview of MIMO Communication and Advanced Topics," (4 day short course) delivered to the Samsung Advanced Technology Training Institute, Suwon, South Korea (invited).
42. August 17, 2006, "Cooperative Communications for Future Wireless Cellular Networks," delivered to the Motorola 2006 SABA Technology Review Meeting, Austin, Texas (invited).
43. July 11, 2006, "On Achievable Sum Rates of A Multiuser MIMO Relay Channel," delivered to the 2006 IEEE International Symposium on Information Theory, Seattle, Washington.
44. June 12, 2006, "Cross Layer Design for MIMO OFDM Mobile Ad Hoc Networks: Antennas, Algorithms, and Protocols," delivered to the Office of Naval Research's Communications Gathering, Naval Research Labs, Washington D.C., USA (invited).
45. May 12, 2006, "Opportunistic feedback - limited feedback protocols," (invited) delivered to Wireless Winter School, Melbourne, Australia.
46. May 7, 2006, "Tutorial: Adaptive MIMO Techniques and Performance: Part I," tutorial delivered to Vehicular Technology Conference, Melbourne, Australia.
47. April 7, 2006, "Antenna and Algorithm Design in MIMO Communication Systems: Exploiting the Spatial Selectivity of Wireless Channels," delivered to Ohio State University, Columbus, OH (invited).
48. March 31, 2006, "Crosslayer Feedback for MIMO-OFDM Communication Systems," delivered to Brigham Young University, Provo, Utah (invited).

49. December 6, 2005 “Introduction to MIMO,” Guest lecture for CS395T: Wireless Networking Seminar (Fall 2005), The University of Texas at Austin.
50. December 6, 2005 “Wireless OFDM Systems,” Guest lecture for EE 345S Real-Time Digital Signal Processing, The University of Texas at Austin.
51. December 2, 2005, “Grassmann Quantization and MIMO Beamforming Systems,” delivered to Korea University, Seoul, Korea (invited).
52. December 2, 2005, “Crosslayer Feedback for MIMO-OFDM Communication Systems,” delivered to Korea University, Seoul, Korea (invited).
53. December 1, 2005, “Grassmann Quantization and MIMO Beamforming Systems,” delivered to KAIST University, Daejeon, Korea (invited).
54. December 1, 2005, “Crosslayer Feedback for MIMO-OFDM Communication Systems,” delivered to ETRI, Daejeon, Korea.
55. November 30, 2005, “MIMO Solutions for Multiuser Cellular and Relay Networks” delivered to Samsung Advanced Institute of Technology, Suwon, Korea (invited).
56. October 31, 2005, “Codebook Adaptation for Quantized MIMO Beamforming Systems” *IEEE Asilomar Conf. on Signals, Systems, and Computers*, Pacific Grove, CA, USA.
57. October 24, 2005, “IEEE 802.16 and WiMAX: Future Wireless Broadband Networks,” delivered to the WNCG Industrial Affiliates Board Meeting, Department of Electrical and Computer Engineering, The University of Texas at Austin, Austin, Texas.
58. October 19, 2005 “Performance evaluation of 2-element array of circular patch antennas in indoor clustered MIMO channels,” delivered at *Military Communications Conference*, Atlantic City, NJ, USA.
59. October 18, 2005 “A Space-Time Receiver for MIMO-OFDM Ad Hoc Networks, delivered at *Military Communications Conference*, Atlantic City, NJ, USA.
60. October 14, 2005, “Feedback Strategies for MIMO-OFDM Communication Systems,” delivered to the Texas A&M University, College Station, Texas (invited).
61. September 21, 2005, “A Scalable Approach for Feedback in MIMO Spatial Multiplexing with Linear Receivers,” delivered to the Eighth International Symposium on Wireless Personal Communications Conference, Aalborg, Denmark, September 18-22, 2005.
62. September 7, 2005, “Interpolation-based Unitary Precoding for Spatial Multiplexing MIMO-OFDM Systems,” delivered to the European Signal Processing Conference (EUSIPCO), Antalya, Turkey, Sept. 4-8, 2005.
63. August 27, 2005, “Feedback Strategies for MIMO-OFDM Communication Systems,” delivered to the University of Melbourne, Melbourne, Australia (invited).

64. August 25, 2005, "Grassmann Quantization and MIMO Beamforming Systems," delivered to the Australian National University, Canberra, Australia (invited).
65. August 5, 2005, "Feedback Strategies for MIMO-OFDM Communication Systems," delivered to the University of Toronto, Toronto, Canada (invited).
66. June 15, 2005, "Frame Theoretic Quantization for Limited Feedback MIMO Beamforming Systems," delivered to WIRELESSCOM 2005, Maui, Hawaii.
67. June 13, 2005, "Feedback Protocols for MIMO Communication Systems," delivered to the 2005 IEEE Communication Theory Workshop, Park City, Utah.
68. May 28, 2005, "The Market Opportunity for Multiple Antenna Technology for Next Generation Broadband Wireless Systems," delivered to the Hong Kong Mobility Roundtable, Hong Kong, China.
69. May 26, 2005, "Feedback Strategies for MIMO-OFDM Communication Systems," delivered to the Hong Kong University of Science and Technology, Hong Kong, China (invited).
70. May 18, 2005, "Feedback Strategies for MIMO-OFDM Communication Systems," delivered to KAIST University, Daejeon, Korea (invited).
71. May 15, 2005, "Feedback Strategies for MIMO-OFDM Communication Systems," delivered to Samsung Advanced Institute of Technology, Suwon, Korea (invited).
72. May 5, 2005, "Space-Time Receiver Design for MIMO Ad Hoc Networks," delivered to Rockwell Collins, Cedar Rapids, Iowa (invited).
73. December 23, 2004, "Feedback Methods for MIMO Communication Systems," delivered to the Indian Institute of Technology, Delhi, India (invited).
74. December 13, 2004, "A Space-Time FIR Equalizer Training Algorithm for MIMO-OFDM Systems," delivered to the 2004 International Conference on Signal Processing and Communications, Bangalore, India.
75. September 1, 2004, "Construction of Equiangular Signatures for Synchronous CDMA Systems," delivered to *IEEE Int. Sym. on Spread Spectrum Techniques and Applications*, Sydney, Australia.
76. August 30, 2004, "Optimal CDMA Signatures: A Finite-Step Approach," delivered to *IEEE Int. Sym. on Spread Spectrum Techniques and Applications*, Sydney, Australia.
77. July 30, 2004, "Precoding and Interpolation for Spatial Multiplexing MIMO-OFDM with Limited Feedback," delivered to The 2004 Workshop on Smart Antennas in Communications, Stanford, California.
78. July 27, 2004, "Interpolation Based Transmit Beamforming for MIMO-OFDM with Limited Feedback," delivered to IEEE International Conference on Communications, Paris, France.

79. July 27, 2004, "Multi-Mode Precoding Using Linear Receivers for Limited Feedback MIMO Systems," delivered to IEEE International Conference on Communications, Paris, France.
80. June 10, 2004, "Recent Results on Feedback Communication Techniques for MIMO Systems," delivered to Communications and Remote Sensing Laboratory, Universite catholique de Louvain, Louvain, Belgium.
81. June 3, 2004, "Overview of Limited Feedback Methods for MIMO Communication Systems," delivered to the Nokia, Helsinki, Finland.
82. June 2, 2004, "A Joint MIMO-OFDM Transceiver and MAC Design for Mobile Ad Hoc Networking," delivered to International Workshop on Wireless Ad-Hoc Networks, Oulu, Finland.
83. May 27, 2004, "Scheduling for Multiuser Multiple Antenna Wireless Systems: User Performance Limits," delivered to the Institut Eurecom, Communications Mobiles, Sophia-Antipolis, France (invited).
84. May 18, 2004, "A Low Complexity Algorithm to Simulate the Spatial Covariance Matrix for Clustered MIMO Channels," delivered to the VTC 2004-Spring, Milan, Italy.
85. March 24, 2004, "Overview of the WNCG," delivered to the City Council Telecommunications Infrastructure subcommittee, Austin, Texas, USA.
86. March 18, 2004, "Unlimited Feedback Methods for MIMO Communication Systems," delivered to the Nokia, Dallas, Texas, USA (invited).
87. March 17, 2004, "Spherical Linear Interpolation for Transmit Beamforming in MIMO-OFDM Systems with Limited Feedback," delivered to Twelfth Annual Workshop on Sensor and Array Processing, Lincoln Labs, Massachusetts Institute of Technology, Lexington, Massachusetts.
88. March 1, 2004, "Quantized Feedback for MIMO-OFDM Systems," delivered to the University of Souther California, Los Angeles, California, USA (invited).
89. February 27, 2004, "Feedback Methods for MIMO Communication Systems," delivered to the University of California at Irvine, Irvine, California, USA (invited).
90. February 26, 2004, "Quantized Feedback for MIMO-OFDM Systems," delivered to the University of California at San Diego, San Diego, California, USA (invited).
91. February 25, 2004, (invited) "Quantized Feedback for MIMO-OFDM Systems," delivered at the University of California at Los Angeles, Los Angeles, California, USA (invited).
92. January 15, 2004, "Unlimited Feedback Methods for MIMO Communication Systems," delivered to Rice University, Houston, Texas, USA (invited).

93. November 21, 2003, "Applications of LabVIEW in DSP and Wireless Communications," delivered to National Instruments Inc., Austin, Texas (invited).
94. November 15, 2003 "Limited-Feedback Communication Techniques for MIMO Systems," delivered to the Texas Systems Day, Southern Methodist University, Dallas, Texas (invited).
95. November 7, 2003, "Student Generated Course Demos," delivered at the Frontiers in Education Conference, Boulder, Colorado, USA.
96. October 31, 2003 "Cross-Layer Optimization for MIMO-OFDM based 4G Communication Systems," delivered to Samsung Advanced Institute of Technology, Suwon, Korea (invited).
97. October 30, 2003 "Limited-Feedback Communication Techniques for MIMO Systems," delivered at Yonsei University, Seoul, Korea (invited).
98. October 30, 2003 "Limited-Feedback Communication Techniques for MIMO Systems," delivered at Seoul National University, Seoul, Korea (invited).
99. October 28, 2003 "MIMO-OFDM for Beyond Third Generation Communication," delivered at the 8th International Conference on Cellular and Intelligent Communications (CIC), Seoul, Korea (invited).
100. October 16, 2003 "A Symbol Estimation Scheme in Alamouti Coded OFDM Systems in Fast Fading Channels," delivered at *Military Communications Conference*, Boston, MA, USA.
101. October 15, 2003 "Grassmannian Precoding for Spatial Multiplexing Systems with Linear Receivers," delivered at *Military Communications Conference*, Boston, MA, USA.
102. October 13, 2003 "Limited-Feedback Communication Techniques for MIMO Systems," delivered to Texas Instruments Inc., Dallas, TX.
103. October 10, 2003 "GSM Physical Layer and Framing Structure," delivered to the WNCG Student Seminar, Austin, TX.
104. September 30, 2003 "Limited-Feedback Communication Techniques for MIMO Systems," delivered to Motorola Labs, Schaumburg, IL (invited).
105. June 17, 2003 "MIMO Wireless Systems: Overview and Challenges in Antenna Design," delivered to Motorola Inc., Austin, Texas for the Motorola Antenna Workshop (invited).
106. April 22, 2003, "Wireless Communication in Vector and Matrix Channels," delivered to Institute for Computational Engineering and Sciences - Math Seminar, at The University of Texas at Austin, Austin, Texas.

107. April 16, 2003, "Applications of LabView in Signal Processing and Communications at UT Austin," delivered to National Instruments Inc., Austin, Texas for NI Academic Week (invited).
108. March 5, 2003, "A Brief Overview of Multi-Antenna Wireless: MIMO Research @ UT Austin," delivered to Applied Research Labs, Austin, Texas (invited).
109. February 27, 2003, "Multi-Antenna Wireless: MIMO Research @ UT Austin," delivered to Motorola Inc., Austin, Texas (invited).
110. February 12, 2003, "Multi-Antenna Wireless: MIMO Research @ UT Austin," delivered to SBC Technology Resources Inc., Austin, Texas (invited).
111. February 5, 2003, "Advances in Wireless Technology: Location Based Secure Encryption & Multi-Antenna Wireless Communication," delivered to the Texas Alliance for Technology Commercialization: Growth by Alliance Forum, Austin, Texas (invited).
112. November 25, 2002, "Wireless OFDM Systems," Guest lecture for EE 345S Real-Time Digital Signal Processing, The University of Texas at Austin.
113. November 20, 2002, "Multiple-Input Multiple-Output Wireless Communication Systems Using Antenna Pattern Diversity," *IEEE Global Telecommunications Conf.*, Taipei, Taiwan, R.O.C.
114. November 19, 2002, "Equal Gain Transmission in Multiple-Input Multiple-Output Wireless Systems," *IEEE Global Telecommunications Conf.*, Taipei, Taiwan, R.O.C.
115. October 17, 2002, "Signal Processing Challenges in MIMO Communication Systems," IEEE Central Texas Section Members Communications and Signal Processing seminar, Austin, TX (invited).
116. October 4, 2002, "On Quasi-Orthogonal Signatures for CDMA Systems," Allerton Conference on Communication, Control, and Computers, Monticello, IL.
117. October 2, 2002, "Spatial Multiplexing in Correlated Fading Via the Virtual Channel Representation," Allerton Conference on Communication, Control, and Computers, Monticello, IL.
118. October 1, 2002, "Adaptive Modulation in MIMO-OFDM Systems and Electromagnetic Characterization of MIMO Channels," Motorola Labs, Schaumburg, IL (invited).
119. September 23, 2002, "Characterizations of Narrowband MIMO Channels," 2002 IEEE Symposium on Advances in Wireless Comm. (ISWC'02), Victoria, BC, Canada (invited).
120. September 4, 2002 "Overview of Wireless Communications," Guest lecture for EE381K.1: Multiuser Wireless Communications, The University of Texas at Austin (invited).
121. August 22, 2002 "Graduate Education: The Ninety Percent Beyond Class," Graduate Student Orientation, The University of Texas at Austin, Austin, TX (invited).

122. August 8, 2002 “MIMO Wireless Channels: An Electromagnetic Perspective,” Texas Instruments Inc., Dallas, TX (invited).
123. August 7, 2002 “Link Adaptation and Channel Prediction in Wireless OFDM Systems,” Midwest Symp. on Circ. and Sys., Tulsa, OK (invited).
124. May 20, 2002 “Characterization of Narrowband Multiple Input Multiple Output Channels,” 2002 IEEE Communication Theory Workshop, Sanibel Island, Florida (invited).
125. April 10, 2002 “Wireless OFDM Systems,” Guest lecture for EE 345S Real-Time Digital Signal Processing, The University of Texas at Austin.
126. March 28, 2002 “Wireless Systems Innovations Laboratory: Introduction and Current Projects,” Delivered to Intel Inc. during a visit to The University of Texas at Austin.
127. February 22, 2002 “Wireless Systems Innovations Laboratory: Introduction and Current Projects,” Texas Instruments Inc., Dallas, TX (invited).
128. February 19, 2002 “Introduction to the Wireless Systems Innovations Lab,” Bandspeed Inc., Austin, Texas.
129. December 7, 2001 “Communicating in Line-of-Sight Multiple-Input Multiple-Output (MIMO) Wireless Channels,” Telecommunications and Signal Processing Seminar, The University of Texas at Austin.
130. November 26, 2001. “Wireless OFDM Systems,” Guest lecture for EE 345S Real-Time Digital Signal Processing, The University of Texas at Austin.
131. November 5, 2001, “Multiuser Diversity for MIMO Wireless Systems with Linear Receivers,” IEEE Asilomar Conf. on Signals, Systems, and Computers, Pacific Grove, CA.
132. July 24, 2001, “Capacity Maximizing Linear Space-Time Codes,” International Symposium on Signals, Systems, and Electronics, Tokyo, Japan (invited).
133. June 14, 2001, “Antenna Selection For Spatial Multiplexing Systems Based On Minimum Error Rate,” IEEE International Conference on Communications, Helsinki, Finland.
134. June 12, 2001, “Characterization Of MIMO Channels For Spatial Multiplexing Systems,” IEEE International Conference on Communications, Helsinki, Finland.
135. June 11, 2001, “Space-Time Signaling in Multiple-Input Multiple-Output (MIMO) Wireless Systems” Ericsson Radio Systems AB, 164 80 STOCKHOLM.
136. June 8, 2001, “Space-Time Signaling in Multiple-Input Multiple-Output (MIMO) Wireless Systems,” Dept. of Electrical and Computer Engineering, Helsinki University of Technology.

137. May 8, 2001, "Space-Time Signaling and Frame Theory," IEEE International Conference on Acoustics, Speech, and Signal Processing, Salt Lake City, UT.
138. April 9, 2001, "Space-Time Signaling in Multiple-Input Multiple-Output (MIMO) Wireless Systems", Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX.
139. March 23, 2001, "Space-Time Signaling in Multiple-Input Multiple-Output (MIMO) Wireless Systems," Division of Engineering and Applied Sciences, Harvard University, Boston, MA.
140. March 2, 2001, "Space-Time Signaling in Multiple-Input Multiple-Output (MIMO) Wireless Systems" Dept. of Electrical and Computer Engineering, University of Massachusetts at Amherst Amherst, MA.
141. February 23, 2001, "Space-Time Signaling in Multiple-Input Multiple-Output (MIMO) Wireless Systems" Dept. of Electrical and Computer Engineering, University of California at Irvine Irvine, CA.
142. February 12, 2001, "Space-Time Signaling in Multiple-Input Multiple-Output (MIMO) Wireless Systems" Dept. of Electrical and Computer Engineering, Polytechnic University Brooklyn, NY.
143. November 2, 2000, "Coordinated Training And Transmission For Improved Interference Cancellation In A Cellular Network," IEEE Asilomar Conf. on Signals, Systems, and Computers, Pacific Grove, CA.
144. September 30, 2000, "Switching Between Multiplexing And Diversity Based On Constellation Distance," Allerton Conference on Communication, Control, and Computers, Monticello, IL.
145. August 19, 1999, "Maximizing Spectral Efficiency In Multiple-Input Multiple-Output Antenna Systems," Toronto, Canada (invited).
146. June 9, 1999, "Transmit Diversity Using Decision Directed Antenna Hopping," IEEE International Conference on Communications - Mini-Conference on Communication Theory, Vancouver, B. C., Canada.
147. June 7, 1999, "Multiple Antenna Arrays For Transmitter Diversity And Space-Time Coding," IEEE International Conference on Communications, Vancouver, B. C., Canada.
148. November 2, 1998, "A Simple Scheme For Transmit Diversity Using Partial Channel Feedback," IEEE Asilomar Conf. on Signals, Systems, and Computers, Pacific Grove, CA.
149. March 20, 1997, "Filterbanks For Blind Channel Identification And Equalization," Conference on Information Sciences and Systems, Baltimore, Maryland.

Patents

1. US #6,067,290 "Spatial Multiplexing in a Cellular Network." A. J. Paulraj, R. W. Heath, Jr., S. K. Peroor, and D. Gesbert. Filed: Jul 30, 1999. Issued: May 23, 2000. Assignee: Iospan Wireless Inc. (formerly Gigabit Wireless Inc.)
2. US # 6,298,092 "Methods of Controlling Communication Parameters of Wireless Systems," R. W. Heath, Jr., S. K. Peroor, and A. J. Paulraj. Filed: June 2, 2000. Issued: Oct. 2, 2001. Assignee: Iospan Wireless Inc.
3. US # 6,377,632 "Wireless communication system and method using stochastic space-time/frequency division multiplexing ," A. J. Paulraj, S. K. Peroor, J. Tellado, R. W. Heath, Jr., S. Talwar, and H. Bölcskei. Filed: January 24, 2000. Issued: April 23, 2002.
4. US # 6,377,636 "Method and wireless communications system using coordinated transmission and training for interference mitigation," A. J. Paulraj, S. K. Peroor, J. Tellado, and R. W. Heath, Jr.. Filed: November 2, 1999. Issued: April 23, 2002.
5. US # 6,678,253, "Subscriber unit incorporating spatial multiplexing ," R. W. Heath, Jr., P. K. Sebastian, R. Chopra, and A. J. Paulraj. Filed: April 7, 2000. Issued: January 13, 2004.
6. US # 6,757,265 "Subscriber unit in a hybrid link incorporating spatial multiplexing," P. K. Sebastian, R. W. Heath, Jr., and A. J. Paulraj. Filed: May 3, 2000. Issued: June 29, 2004.
7. US # 6,760,882 "Mode selection for data transmission in wireless communication channels based on statistical parameters," D. Gesbert, S. E. Catreux, R. W. Heath, Jr., P. K. Sebastian, Arogyaswami J. Paulraj. Filed: September 19, 2000. Issued: July 6, 2004.
8. US # 6,850,498 "Method and system for evaluating a wireless link," R. W. Heath, Jr. and J. Tellado. Filed: December 22, 2000. Issued: February 1, 2005.
9. US # 6,937,592 " Wireless communications system that supports multiple modes of operation," R. W. Heath, Jr., R. Krishnamoorthy, K. Peroor, and A. J. Paulraj. Issued: August 30 1, 2005.
10. US # 7,058,146 "Method and wireless communications systems using coordinated transmission and training for interference mitigation," A. J. Paulraj, K. Peroor, J. Tellado, and R. W. Heath, Jr.. Issued: June 6, 2006.
11. US # 7,191,381 "Mode lookup tables for data transmission in wireless communication channels based on statistical parameters," D. J. Gesbert, S. E. Catreux, and R. W. Heath, Jr.. Issued: March 13, 2007.
12. US # 7,328,033, "Wireless network system and method," T. Rappaport and R. W. Heath, Jr.. Issued: February 2, 2008.

13. US RE40,056, "Methods of Controlling Communication Parameters of Wireless Systems," R. W. Heath, Jr., S. K. Peroor, and A. J. Paulraj. Filed: October 2, 2003. Issued: Feb 12, 2008.
14. US # 7,392,054, "Resource allocation scheduling method for a cellular communication system," S.-H. Cho, R. W. Heath, Jr., S.-B. Yun, W.-H. Park, M. Airy. Issued: June 24, 2008.
15. US # 7,486,931, "System and method for reselecting antennas in a cellular mobile communication system using multiple antennas," S.-H. Cho and R. W. Heath, Jr.. Issued: February 3, 2009.
16. US # 7,586,873, "Wireless communications system that supports multiple modes of operation," R. W. Heath, Jr., R. Krishnamoorthy, S. K. Peroor, and Arogyaswami J. Paulraj. Issued September 8, 2009.
17. Several other patents currently under review.

Prototyping Projects

- January 2009 - present. *Interference Alignment: Practical Performance* Leading a group of graduate students to build a testbed to measure interference channels and validate the concept of interference alignment. The system thus far implements six OFDM transmitter and receivers, enabling experiments with three 2×2 MIMO-OFDM interference channels among other combinations. The physical layer was implemented using National Instruments hardware and LabVIEW software.
- June 2006 - present. *Hydra: MIMO-OFDM Ad Hoc Network*. Working with Prof. Scott Nettles on a MIMO-OFDM ad hoc network prototype with a flexible physical and MAC layer. The physical layer implements most features of IEEE 802.11n using the GNU radio framework and USRP for data transmission. The MAC layer is implemented in the Click modular router framework. Various experiments are being conducted including real-world performance of limited feedback, cross-layer protocol design, and learning-based adaptive modulation.
- June 2004 - May 2006. *MIMO-OFDM Ad Hoc Network*. Led a group of graduate students in the construction of a MIMO-OFDM ad hoc network. Partially funded by two grants from the National Science Foundation and one from National Instruments. Radio is implemented using Texas Instruments 802.11a/b/g RF. Physical layer implemented in LabVIEW in an embedded PC on a PXI chassis. MAC and routing functions implemented using the Click Modular Router. PHY - MAC interface via Gigabit Ethernet. Four nodes were constructed in this testbed.
- Sept. 2003 – Sept. 2004. *Rapid MIMO-OFDM Prototyping at UT Austin*. Led a group of undergraduate and graduate students in the creation of a two transmit and two receive antenna MIMO-OFDM communication link entirely from National Instruments commercial-off-the-shelf products. Partially funded by the National Science Foundation and National Instruments. Complete software and system design available for free download.

- Oct. 2000 – Nov. 2001. *Stanford University MIMO Test Bed*. Advised on the development of a six-channel MIMO test bed with bandwidth 2MHz operating at 2.4GHz. Will validate both narrowband, broadband, and OFDM based multiple-input multiple-output system architectures.
- March 1999 – May 1999. *First generation channel measurement system at Gigabit Wireless Inc.* Developed software and hardware to perform two transmit / two receive antenna channel measurements in the 900MHz band. Algorithms proposed and implemented for all functions including training and synchronization. Software development included programming complete system on the PC and later on the TI C60 DSP with fixed point processing. Existing RF hardware platform from the single carrier prototype (see below) was reinforced for outdoor measurements.
- Nov. 1998 – April 1999. *First generation prototype at Gigabit Wireless Inc.* Worked with a team to develop a three transmit antenna / three receive antenna MIMO downlink with 50kHz bandwidth operating at 900MHz. Led the physical layer software development for both transmitter and receiver. Features included spatial multiplexing with different receiver options, transmit diversity, error correction coding, and retransmission. Demonstrated spectral efficiencies of 18b/s/Hz in an indoor wireless channel. Algorithms proposed for frame and symbol timing, channel estimation, DC offset estimation, I/Q gain/phase imbalance estimation and correction. Accomplished, with the networking team, a web browsing demonstration over the downlink (via TCP/IP).
- May. 1998 – Sept. 1998. *Stanford University Space-time Processing TDMA Test Bed*. Worked with a team to develop a GSM space-time processing test bed. Responsible for implementing various algorithms including synchronization in the presence of intersymbol interference, channel estimation, and equalization. Receive architectures included beamforming, single and multichannel Viterbi algorithms, and joint interference cancellation followed by Viterbi decoding.

Copyrighted Software

- Hydra: MIMO-OFDM Multi-hop Testbed developed by K. Mandke, R. Daniels, S.-H. Choi, W. Kim, R. W. Heath, Jr. and S. Nettles.
- LabVIEW MIMO Toolkit developed by R. W. Heath, Jr., B. Mondal, and S. Patil.

Continuing Education

- Co-organizer of the Wireless Networking and Communications Seminar with Brian L. Evans and then S. Shakkottai from January 2002 - May 2004. In Fall 2002, the seminar series was funded from Tivoli. In Fall 2003, the seminar series was funded by GM. This seminar is held weekly during long semesters. Seminar announcements are posted on the Web and to an e-mail list that includes over 50 people from local industry (AMD, Analog Devices, Cicada, Cirrus, Crystal, ESS Technology, IBM, I/O Systems, Motorola, National Instruments, SBC, Schlumberger, Shell, The Silicon Group, and Tracor).

Current Graduate Students

- Students admitted to candidacy
 - Ramya Bhagavatula
 - Robert Daniels
 - Takao Inoue
- Post M.S. students
 - Salam Akoum
 - Raquel Buckley
 - Chao Chen
 - Khursheed Hassan
 - Insoo Hwang
 - Minchan Lee
 - Alvin Leung
 - Behrang Nosrat Makouei
 - Ali Yazdan-Panah
 - Steven Peters
 - Kien Trung Truong
 - Jun Zheng
- M.S. in progress
 - Omar Al Ayache
 - Zheng Li

Graduate Students Supervised

- Ph.D. Dissertations
 - Manish Airy (joint w/ Sanjay Shakkottai) *Multiple Antenna Wireless Systems: Capacity and User Performance Limits*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2006. Current Position: Principle Design Engineer at Beceem Communications, Inc.
 - Chan-Byoung Chae, *Coordinated Wireless Multiple Antenna Networks: Transmission Strategies and Performance Analysis*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, December 2008. Current Position: Post-Doctoral Fellow at Harvard University.

- Sumohana C. Channappayya, *Image Communication System Design Based on the Structural Similarity Index*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, December 2007. Current Position: Senior Member of Technical Staff at PacketVideo Corp.
- Runhua Chen, *Multiuser MIMO Communication Systems with Cooperative Transmission*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, December 2007. Current Position: Senior Member of the Technical Staff at Texas Instruments.
- Antonio Forenza *Antenna and Algorithm Design in MIMO Systems Exploiting the Spatial Selectivity of Wireless Channels*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2006. Current Position: Senior Engineer at Rearden Inc.
- Kaibin Huang, *MIMO Networking with Imperfect Channel State Information*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2008. Current Position: Assistant Professor at Yonsei University.
- Caleb Lo, *Relay-Assisted Communication: Fundamental Limits and Selection Strategies*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, December 2008. Sr. Signal Processing Engineer at MITRE.
- David J. Love *Feedback Methods for Multiple-Input Multiple-Output Wireless Systems*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2004. Currently an Assistant Professor at Purdue University.
- Bishwarup Mondal, *Grassmann Quantization for Precoded MIMO Systems*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2006. Current Position: Senior Member of the Technical Staff, Motorola Labs, Schaumburg, IL.
- M. Farooq Sabir *Joint Source-Channel Distortion Modeling for Image and Video Communication*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2006. Current Position: Member of the Technical Staff, K-WILL Corporation, Los Angeles, CA.
- Taiwen Tang *Multiple Antenna Downlink: Feedback Reduction, Interference Suppression and Relay Transmission*, Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, August 2006. Current Position: Postdoctoral Fellow, University of Toronto, Canada.
- Rahul Vaze *Transmission Strategies for Multiple Antenna Wireless Ad-hoc and Relay Networks*. Ph.D. Dissertation, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, December 2009.

Current Position: Assistant Professor, Tata Institute of Fundamental Research, Mumbai, India.

- MS Reports & Theses

- Ramya Bhagavatula *Generating Equivalent Clustered Channel Models from Stanford University Interim (SUI) Channel Models for MIMO Systems*, MSEE Report, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, January 2007.
- Robert Daniels *An M-ary Continuous Phase Modulated System with Coherent Detection and Frequency Domain Equalization*, MSEE Report, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2006.
- Kien Trung Truong *The Transmission Capacity of Two-way Communication Wireless Ad hoc Networks*, MSEE Thesis, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-1084, May 2008.
- Caleb Lo *Rate Bounds for MIMO Relay Channels Using Precoding*, MSEE Thesis, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-1084, May 2005.
- Min Chan Lee *Multiuser Beamforming in the MIMO Multicast Channel with Limited Feedback*, MSEE Report, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2008.
- David J. Love *Transmit Diversity Quantization Methods for Multiple-Input Multiple-Output Wireless Systems*, MSEE Thesis, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-0240, May 2002.
- Jason Potterf *Interfacing Open-Source Software Radio Systems with Visual Programming Languages*, MSEE Report, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-1084, December 2007.
- Roopsha Samanta *Joint Space-Time Interference Cancellation and Channel Shortening*, MSEE Report, Dept. of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-1084, December 2003.

- MS Supervised (no report)

- Johann Chiang, May 2005.
- Alvin Leung, May 2008.

Other Research Supervision

- Ph.D. Defense Committees: Liang Dong, Jaekwon Kim (4/16/05), Serene Banerjee, Ming Ding, David Love, Minyoung Park (7/19/05), Yaoqing Yang, Zukang Shen, Manish Airy, Aamir Hasan, Antonio Forenza, Taiwen Tang, M. Farooq Sabir, Bishwarup Mondal

- Ph.D. Qualifying Committees: Serene Banerjee, Wan Choi (6/27/05), Yaoqing Yang, Ming Ding, Taeyoon Kim (4/4/05), Hoojin Kim, David Love, Minyoung Park, Zukang Shen, Aamir Hasan, Changyoung Shin (5/2/05), Ian Wong (5/4/05), Yihong Zhou
- M.S. Thesis Committees: Caleb Lo
- M.S. Report Committees: Ramya Bhagavatula, Robert Daniels, David Love, Jason Potterf, Roopsha Samanta, Vikrant Venkateshwar Gunna Srinivasan, Marghoob Mohiyuddin
- Undergraduate senior design students: S02 Anuj Patel, S02 Mihir Anandpara (attended grad school at UT Austin), F02 Rudy Dharsono, F02 Tony Oseghale, F02 Bailey Yeung, F02 Erwin Hermanto (attended grad school at Rice), S03 Navanit Arakeri (attended grad school at Stanford University), Sm03 Francisco Miranda (currently at UT Austin), F03 Wai-Leung Chu, F03 Amit Gupta (attended grad school at Stanford University), F03 Osama Hashmi, F03 Veynu Narasiman, F03 Paul Nichols, F03 Patrick Tong, F03 Brett Westervelt (employed at SiLabs), S04 David T. DeZern (attended Law school), F04 Shrut Kirti (also GLUE student, attended grad school at Cornell), F04 Jonathan Waltz, F04 Jason Mitchell, S06 Daniel Zitrick, S06 Greg Van Westen.
- Other undergraduate supervision: Alex Tsanakov (VIGRE project, attended grad school at MIT), Amit Gupta (plan II thesis, working on wallstreet), Ashwin Giridharagopal (Dell antenna design F04), Brian Mechler (Dell antenna design F04), Frank Sun (Dell antenna design F04), Gordon Wan (Dell antenna design F04), Charles Shoubing (worked on GNU radio Sm05), Jason Soric (worked on 60GHz project)
- Visiting undergraduates: Iker Almandoz (attended grad school at Stanford University)
- Postdoctoral research assistants: Kyung Seung Ahn (Ph.D. from Chungbuk National University, October 2005-present) Jihoon Choi (Ph.D. from Korea Advanced Institute of Science and Technology, March 2003-2004) Keul-Chung Hwang (Ph.D. from Seoul National University, January 2004-2005) Myonghee Park (Ph.D. from Yonsei University, October 2005 - September 2006) Muhammad Farooq Sabir (Ph.D. from UT Austin, funded by my grant, my former Ph.D. student) Seijoon Shim (Ph.D. from Yonsei University, October 2005-June 2007)

Vita

Robert W. Heath, Jr. is an Associate Professor in the Department of Electrical and Computer Engineering at The University of Texas at Austin and is a member of the Wireless Networking and Communications Group where he directs the Wireless Systems Innovations Laboratory. He received his B.S.E.E. (1996) and his M.S.E.E. (1997) degrees from the University of Virginia, and the Ph.D.E.E. (2002) degree from Stanford University. From 1998 to 1999, he was a Senior Member of the Technical Staff at Iospan Wireless Inc, San Jose, CA where he played a key role in the design and implementation of the physical and link layers of the first commercial MIMO-OFDM communication system. The proposed broadband wireless access system employed OFDM modulation, MIMO technology, and adaptive space-time modulation. From 1999 to 2001 he served as a Senior Consultant for Iospan Wireless Inc. In 2003 he founded MIMO Wireless Inc, a consulting company dedicated to the advancement of MIMO technology. Since January 2002, he has been with the Department of Electrical and Computer Engineering at The University of Texas at Austin where he serves as an Associate Professor and is affiliated with the Wireless Networking and Communications Group. He has consulted for a variety of international companies.

Prof. Heath's current research include all aspects of MIMO communication including antenna design, practical receiver architectures, limited feedback techniques, mobility management, and scheduling algorithms as well as cognitive radio, 60GHz wireless communication, and body area networks. He teaches courses on a variety of topics including Wireless Communication, Digital Signal Processing, Space-Time Communication, and Statistical Signal Processing, to support his research program in wireless communication systems. He has published over 150 refereed conference and journal papers, been awarded 15 patents, and is the author of the forthcoming book *Advanced MIMO Communication*. Dr. Heath has been an Editor for the IEEE Transactions on Communication and an Associate Editor for the IEEE Transactions on Vehicular Technology. He is a member of the Signal Processing for Communications Technical Committee in the IEEE Signal Processing Society. He was a technical co-chair for the 2007 Fall Vehicular Technology Conference, is the general chair of the 2008 Communication Theory Workshop, is a co-organizer and co-technical-chair of the 2009 Signal Processing for Wireless Communications Workshop, and is co-technical-chair of the 2010 International Symposium on Information Theory. He is the recipient of the David and Doris Lybarger Endowed Faculty Fellowship in Engineering and is a registered Professional Engineer in Texas.

Computer Skills

- Assembly languages: Texas Instruments TMS320C6000 VLIW DSP, Motorola 68000, PDP 11
- High-level languages: C, C++, Pascal, Fortran, LabVIEW
- Algorithm development environments: Maple, Mathematica, Matlab