Curriculum Vitae of Wenyi Zhang

Contact Information

Communication Sciences Institute
Ming Hsieh Department of Electrical Engineering
University of Southern California
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Research Interests

- Communication under random and uncertain environments
- Cognitive radios
- Multiuser communications systems
- Communication and networking issues in underwater acoustic systems
- Information theory
- Internet traffic analysis using signal processing techniques

Education and Professional Experience

- September 2006 – present: The University of Southern California, Los Angeles, CA
  Title: Postdoctoral Research Associate
  Mentor: Urbashi Mitra
- August 2003 – August 2006: The University of Notre Dame, Notre Dame, IN
  Title: Ph.D. in Electrical Engineering
  Dissertation: "The Role of Correlation in Communication over Fading Channels"
  Advisor: J. Nicholas Laneman
- August 2001 – May 2003: The University of Notre Dame, Notre Dame, IN
  Title: M.S. in Electrical Engineering
- September 1997 – June 2001: Tsinghua University, Beijing, China
  Title: B.E. in Automation

Honors and Awards

- Kaneb Graduate Student Award for Excellence in Teaching, The University of Notre Dame, 2005
- Center for Applied Mathematics (CAM) Fellowship, The University of Notre Dame, Summer 2004, 2005
- Michael J. Birck Endowed Graduate Fellowship, The University of Notre Dame, 2002
- Tsinghua-Chinese Academy of Sciences (CAS) Fellowship, Tsinghua University, 2001
- Fellowship for Distinguished Students, Tsinghua University, 1999, 2000
- Fellowship for Distinguished Freshmen, Tsinghua University, 1997
- China Physics Olympiad, National Second Prize, 1996
- China Mathematics Olympiad, Provincial First Prize, 1996

List of Publications

Preprints

$P1$ W. Zhang and U. Mitra, "Orthogonal Codes for Robust Low-Cost Communication," submitted to *IEEE Transactions on Information Theory*, accepted with minor revisions; also archived as

USC CSI Technical Report CSI-07-02-01

$P2$ W. Zhang, S. Kotagiri, and J. N. Laneman, "Outage-Efficient Downlink Transmission without Transmit Channel State Information," submitted to *IEEE Transactions on Information Theory*, November 2007

$P3$ W. Zhang and U. Mitra, "On Outage Behavior of Wideband Slow-Fading Channels," submitted to *IEEE Transactions on Information Theory*, November 2007; also archived as *USC CSI Technical Report CSI-07-08-01*

$P4$ W. Zhang, "An Addendum to 'How Good is PSK for Peak-Limited Fading Channels in the Low-SNR Regime?'," submitted to *IEEE Transactions on Information Theory*, January 2008

$P5$ W. Zhang and U. Mitra, "A Spectrum-Shaping Perspective on Cognitive Radio — Uncoded Primary Transmission Case," submitted to *IEEE International Symposium on Information Theory (ISIT)*, Toronto, Canada, July 2008

$P6$ W. Zhang, S. Vedantam, and U. Mitra, "A Constrained Channel Coding Approach to Joint Communication and Channel Estimation," submitted to *IEEE International Symposium on Information Theory (ISIT)*, Toronto, Canada, July 2008

$P7$ W. Zhang, U. Mitra, and M. Chiang, "Channel-Adaptive Frequency-Domain Relaying in Multicarrier Multihop Transmission," in preparation

$P8$ W. Zhang, M. Stojanovic, and U. Mitra, "Analysis of an Underwater Acoustic Relay Channel," in preparation

Published Journal Articles (in reverse chronological order)

$J3$ W. Zhang and J. N. Laneman, "Benefits of Spatial Correlation for Multi-Antenna Non-Coherent Communication over Fading Channels at Low SNR," *IEEE Transactions on Wireless Communications*, Vol. 6, No. 3, pp. 887-896, March 2007 (Note: Figures 1 and 2 of the journal paper were mysteriously replaced in the publication process, and a corrected version is available upon request.)

$J2$ W. Zhang and J. N. Laneman, "How Good is PSK for Peak-Limited Fading Channels in the Low-SNR Regime?" *IEEE Transactions on Information Theory*, Vol. 53, No. 1, pp. 236-251, January 2007

$J1$ W. Zhang and J. N. Laneman, "An Induced Additive-Noise Model for Memoryless Rayleigh Fading Channels," *IEEE Transactions on Information Theory*, Vol. 52, No. 4, pp. 1756-1764, April 2006

Published Conference Papers (in reverse chronological order)

$C14$ W. Zhang and U. Mitra, "Channel-Adaptive Frequency-Domain Relay Processing in Multicarrier Multihop Transmission," to appear in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Las Vegas, NV, March-April 2008

$C13$ W. Zhang and U. Mitra, "Orthogonal Codes for Robust Low-Cost Communication," (invited paper) to appear in *Proc. Information Theory and Applications (ITA) Workshop*, San Diego, CA, January-February 2008

$C12$ W. Zhang and U. Mitra, "Transmitted-Reference UWB: A Digital Approach," (invited paper) in *Proc. the Forty-first Annual Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, November 2007

$C11$ W. Zhang and U. Mitra, "On Outage Behavior of Wideband Slow-Fading Channels," in *Proc. the Forty-fifth Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2007

$C10$ W. Zhang and U. Mitra, "A Delay-Reliability Analysis for Multihop Underwater Acoustic Communication," in *Proc. the Second ACM International Workshop on Underwater Networks (WUWNet)*, Montreal, Quebec, Canada, September 2007

$C9$ S. Vedantam, W. Zhang, U. Mitra, and A. Sabharwal, "Joint Channel Estimation and Data

Transmission: Achievable Rates," in *Proc. 2007 IEEE Information Theory Workshop (ITW)*, Lake Tahoe, CA, September 2007

$C8$ W. Zhang and U. Mitra, "Multihopping Strategies: An Error-Exponent Comparison," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Nice, France, June 2007

$C7$ W. Zhang, S. Kotagiri, and J. N. Laneman, "Writing on Dirty Paper with Resizing and its Application to Quasi-Static Fading Broadcast Channels," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Nice, France, June 2007

$C6$ W. Zhang, S. Kotagiri, and J. N. Laneman, "Information Transmission over the Postal Channel with and without Feedback," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Seattle, WA, July 2006

$C5$ W. Zhang and J. N. Laneman, "How Good is Phase-Shift Keying for Peak-Limited Rayleigh Fading Channels in the Low-SNR Regime?" in *Proc. 43rd Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2005

$C4$ W. Zhang and J. N. Laneman, "Recursive Training with Unitary Modulation for Correlated Block-Fading MIMO Channels," in *Proc. 6th IEEE International Workshop on Signal Processing Advances for Wireless Communications (SPAWC)*, New York City, NY, June 2005

$C3$ W. Zhang and J. N. Laneman, "An Induced Additive-Noise Model for Non-Coherent Discrete-Time Memoryless Rayleigh Fading Channels," in *Proc. 39th Annual Conference on Information Sciences and Systems (CISS)*, Baltimore, MD, March 2005

$C2$ W. Zhang and J. N. Laneman, "Benefits of Correlated MIMO Schemes for Wideband Communication," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Chicago, IL, July 2004

$C1$ W. Zhang, "Stabilization of Networked Control Systems over a Sharing Link Using ALOHA," in *Proc. 42nd IEEE Conference on Decision and Control (CDC)*, Maui, HI, December 2003

Technical Reports

$TR1$ W. Zhang, "A Low-Complexity Scheme for Fast Rayleigh Fading Channels," *USC CSI Technical Report CSI-07-10-02*, October 2007

Patents

$PT1$ Provisional patent: "Log-Scale Uniform Coded Modulation for Wireless Digital Communication Systems Operating over Fast Fading Channels," with J. N. Laneman, 60/642,120, January 2005

Talks

$T1$ Seagate Research Center, "Interplay between Estimation and Coding for Communication over Fading Channels," Pittsburgh, PA, March 2006

$T2$ Department of Electrical Engineering, University of Notre Dame, "Efficient Strategies for Quasi-Static Fading Broadcast Channels," Notre Dame, IN, May 2007

$T3$ Communication Sciences Institute, University of Southern California, "Broadcasting without Knowing the Channel: Outage-Efficient Transmission," Los Angeles, CA, November 2007

$T4$ Qualcomm Incorporated Research and Development, "A Spectrum-Shaping Perspective on Cognitive Radio," San Diego, CA, December 2007

$T5$ The Information Theory and Applications (ITA) Center, Graduation Day invited talk, "A Spectrum-Shaping Perspective on Cognitive Radio," San Diego, CA, January 2008

- Conference presentations at international conferences, including: *Annual Allerton Conference on Communication, Control, and Computation*; *Annual Asilomar Conference on Signals, Systems, and Computers*; *Annual Conference on Information Sciences and Systems (CISS)*; *IEEE Conference*

on Decision and Control (CDC); *IEEE International Symposium on Information Theory (ISIT)*; *Information Theory and Applications (ITA) Workshop*

Posters

*PS*1 W. Zhang and J. N. Laneman, "Recursive Training with Unitary Modulation for Correlated Block-Fading MIMO Channels," *6th IEEE International Workshop on Signal Processing Advances for Wireless Communications (SPAWC)*, New York City, NY, June 2005
*PS*2 W. Zhang and U. Mitra, "Channel-Adaptive Frequency-Domain Relay Processing in Multi-carrier Multihop Transmission Systems," *5th Annual Research Review, Center for Embedded Networked Sensing (CENS)*, Los Angeles, CA, October 2007
*PS*3 S. Vedantam, W. Zhang, U. Mitra, and A. Sabharwal, "Achievable Rates of Joint Communication and Channel Estimation," *5th Annual Research Review, Center for Embedded Networked Sensing (CENS)*, Los Angeles, CA, October 2007

Teaching Record

- Fall 2007, The University of Southern California, Los Angeles, CA
  Ming Hsieh Department of Electrical Engineering
  Title: Instructor
  Course: Mobile Communications (EE535)
- Spring 2006, The University of Notre Dame, Notre Dame, IN
  Department of Electrical Engineering
  Title: Instructor
  Course: Limiting Analysis with Communications Applications (EE67025)
- Fall 2005, The University of Notre Dame, Notre Dame, IN
  Department of Electrical Engineering
  Title: Teaching Assistant
  Course: Information Theory (EE80653)
- Spring 2004, The University of Notre Dame, Notre Dame, IN
  Department of Electrical Engineering
  Title: Teaching Assistant
  Course: Signals and Systems II (EE354)

Professional Activities

Member: Institute of Electrical and Electronics Engineers (IEEE, Student Member 2000 – 2006, Member 2007 –)
Society for Industrial and Applied Mathematics (SIAM, Member 2006 –)
Sigma Xi (Member 2007 –)

Reviewer: *Automatica*, *IEEE Journal on Selected Areas in Communications*, *IEEE Transactions on Automatic Control*, *IEEE Transactions on Communications*, *IEEE Transactions on Information Theory*, *IEEE Transactions on Signal Processing*, *IEEE Transactions on Wireless Communications*

American Control Conference (ACC), *IEEE Conference on Decision and Control (CDC)*, *IEEE Global Communications Conference (GLOBECOM)*, *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, *IEEE International Conference on Communications (ICC)*, *IEEE International Symposium on Information Theory (ISIT)*, *IEEE Multi-Conference on Systems and Control (MSC)*, *IEEE Wireless Communications & Networking Conference (WCNC)*, *IEEE*

Workshop on Signal Processing Advances in Wireless Communications (SPAWC), *International Conference on Broadband Networks (BROADNETS)*, *International Wireless Communications and Mobile Computing Conference (IWCMC)*

References

- Giuseppe Caire
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