

## Venugopal V. Veeravalli

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### EDUCATION

**University of Illinois at Urbana-Champaign**, Ph.D. in *Electrical Engineering*, October, 1992

Dissertation: *Topics in Decentralized Detection*

Advisors: Prof. H. Vincent Poor and Prof. Tamer Başar

**Carnegie-Mellon University**, Pittsburgh, PA, M.S. in *Electrical Engineering*, May, 1987

Thesis: *Detection of Digital Signals in Erased Magnetic Disks*

**Indian Institute of Technology**, Bombay, B. Tech. (B.S.) in *Electrical Engineering*, May, 1985

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### PROFESSIONAL EXPERIENCE

**Professor**, (2005-present), Department of ECE, and **Research Professor**, Coordinated Science Laboratory, *University of Illinois at Urbana-Champaign*

**Program Director**, (2003-2005), CISE/CCF/TF, *National Science Foundation*, Arlington, VA

**Associate Professor**, (2000-2005), Department of ECE, and **Research Associate Professor**, Coordinated Science Laboratory, *University of Illinois at Urbana-Champaign*

**Visiting Professor**, (summer 2002), Communication Technology Laboratory, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland

**Assistant Professor**, (1996-2000), School of Electrical Engineering, *Cornell University*. (Also member of graduate fields of Applied Mathematics and Statistical Science.)

**Visiting Assistant Professor**, (1994-1996), ECE Department, *Rice University*

**Assistant Professor**, (1993-1994), EE Department, *City College and Graduate School, CUNY*

**Postdoctoral Fellow**, (1992-1993), Division of Applied Sciences, *Harvard University*

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### AWARDS AND HONORS

**Fellow of the IEEE**, 2006, “for contributions to wireless communications and sensor networks.”

**Xerox Award for Faculty Research**, College of Engineering, U. Illinois, 2003.

**Beckman Associate of the Center for Advanced Study**, U. Illinois, 2002-2003.

**Michael Tien Excellence in Teaching Award**, College of Engineering, Cornell University, 1999.

**PECASE (Presidential Early Career Award for Scientists and Engineers)**, 1999, to recognize outstanding research in wireless communications and for innovations in teaching. This is “the highest honor bestowed by the U.S. government on outstanding new scientists and engineers who are in the early stages of establishing their independent research careers.”

**CAREER Award**, National Science Foundation, 1998.

**IEEE Browder J. Thompson Prize Award**, 1996, an award given to an outstanding paper by authors under the age of 30 selected from all the publications of the IEEE. The award winning paper: “A Sequential Procedure for Multihypothesis Testing” (see publication [J9]).

**Institute Silver Medal**, IIT, Bombay, 1985.

**J. N. Tata Scholarship** for overseas education, Bombay, 1985.

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## MEMBERSHIPS

**Fellow**, *IEEE*, and *IEEE Information Theory, Communications, Signal Processing* societies.

**Past Chair** of the Ithaca Section of the IEEE.

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## SERVICE ACTIVITIES

**Member of the Board of Governors** of the *IEEE Information Theory Society*, 2004-2007.

**Associate Editor, Detection & Estimation** for *IEEE Transactions on Information Theory*, 2000-2004

**Associate Editor** for *IEEE Transactions on Wireless Communications*, 2000-2001

**Editor Board Member** for *Journal of Advances in Information Fusion*, 2003-present

**Editorial Board Member** for *Communications in Information and Systems (CIS)*, 2001-present

**Chair, IEEE Ithaca Section**, 1999 – 2000

**Coorganizer** of the *National Academy of Engineering*, 2001 Frontiers of Engineering Conference

**Invited Participant** in the *National Academy of Engineering*, Frontiers of Engineering Conference, Irvine, CA, September 2000

**Coorganizer** of *NSF/ONR Workshop* on Future Directions in Systems and Control Research in Communication Networks, Airlie, VA, November 1998

**Panelist** at *DOE/ONR/NSF Workshop* on Foundations of Information/Decision Fusion and Applications to Engineering, Washington D.C., August 1996

**General Co-Chair** for 2003, 2004 *Allerton Conference on Communication, Control, and Computing*

**Tutorial Chair** for *IEEE ISIT 2004*, Chicago, IL, June-July, 2004

**Session Organizer/Chair** for several wireless communications sessions at 1999, 2000, 2001, 2002, 2006 *Allerton Conference on Communication, Control, and Computing*

**Technical Program committee member/session organizer** for several conferences, including *IEEE ISIT, IEEE Asilomar, IEEE SPAWC, IEEE SSPW, IEEE Fusion, IASTED CIIT, IEEE RAWNET, IEEE MILCOM*.

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## RESEARCH ACTIVITIES

**Summary:** Veeravalli conducts research in sensor networks, wireless communications, detection and estimation theory, and information theory. The broad goals of his research program are: (i) to develop techniques for optimizing the quality and capacity of wireless communication systems; and (ii) to develop a system-theoretic framework for the design, analysis and application of sensor networks.

### Current Research Topics

- Design of sleeping policies for energy efficient localization and tracking in sensor networks
- Decentralized and distributed detection in sensor networks
- Capacity and space-time code design for MIMO channels under realistic assumptions
- Noncoherent capacity of wireless channels
- Relaying and user cooperation in broadcast channels
- Signal detection and channel selection for cognitive radio
- Channel modeling for wideband and multiantenna wireless systems
- Asymptotic robust hypothesis testing based on moment classes
- Sequential hypothesis testing and change point detection

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## PUBLICATIONS

**Note:** *Many of these publications are available on* <http://www.ifp.uiuc.edu/~vvv>

### Books and Book Chapters

[B3] V. V. Veeravalli and J.-F. Chamberland. "Detection in Sensor Networks." To appear in *Wireless Sensor Networks. Signal Processing and Communications Perspectives*, A. Swami et al (Eds.), Wiley, 2006.

[B2] A. G. Tartakovsky and V. V. Veeravalli. "Change-Point Detection in Multichannel and Distributed Systems With Applications." In *Applied Sequential Methodologies: An Edited Volume*, N. Mukhopadhyay, S. Datta, and S. Chattopadhyay (Eds.), Marcel-Dekker, 2004.

[B1] V. V. Veeravalli, T. Başar and H. V. Poor. "Decentralized Sequential Detection with a Fusion Center Performing the Sequential Test." *IEEE Transactions on Information Theory*, 39(2): 433-442, March 1993. Reprinted as pages 186–195 in "Selected Papers on Sensor and Data Fusion," F. A. Sadjadi (Edt.), SPIE Milestone Series, Volume MS 124, SPIE Engineering Press, 1996.

### Submitted/To-be-submitted Journal Papers

[P4] J. Fuemmeler and V.V. Veeravalli. "Smart Sleeping Policies for Energy Efficient Tracking in Sensor Networks." Submitted to the *IEEE Transactions on Signal Processing*, October 2006.

[P3] C. Lin and V.V. Veeravalli. "Optimal Linear Dispersion Codes for Correlated MIMO Channels." Submitted to the *IEEE Transactions on Wireless Communications*, August 2006. Revised December 2006.

[P2] Y. Liang, V.V. Veeravalli and H.V. Poor "Resource Allocation for Wireless Fading Relay Channels: Max-Min Solution." Submitted to *IEEE Transactions on Information Theory, Special Issue on Models, Theory and Codes for Relaying and Cooperation in Communication Networks*, August 2006. Revised January 2007.

[P1] J. Chen and V.V. Veeravalli. "Capacity Results for Block-Stationary Gaussian Fading Channels with a Peak Power Constraint." Submitted to *IEEE Transactions on Information Theory*, May 2006.

## Journal Publications

- [J40] J.-F. Chamberland and V. V. Veeravalli. "Detection in Sensor Networks." To appear in *IEEE Signal Processing Magazine Special Issue on Resource-Constrained Signal Processing, Communications, and Networking*, May 2007.
- [J39] Y. Liang and V. V. Veeravalli. "Cooperative Relay Broadcast Channels." To appear in the *IEEE Transactions on Information Theory*, March 2007.
- [J38] R. Prakash and V. V. Veeravalli. "Centralized Wireless Data Systems with User Arrivals and Departures." To appear in the *IEEE Transactions on Information Theory*, February 2007.
- [J37] J.-F. Chamberland and V. V. Veeravalli. "How Dense Should a Sensor Network be for Decentralized Detection with Correlated Observations?." *IEEE Transactions on Information Theory*, 52(11):5099-5106, November 2006.
- [J36] Y. Liang and V. V. Veeravalli. "Gaussian Orthogonal Relay Channels: Optimal Resource Allocation." *IEEE Transactions on Information Theory*, 51(9):3284 - 3289, Sept 2005.
- [J35] V. V. Veeravalli, Y. Liang and A. M. Sayeed. "Correlated MIMO wireless channels: capacity, optimal signaling, and asymptotics." *IEEE Transactions on Information Theory*, 51(6):2058-2072, June 2005.
- [J34] S. Appadwedula, V. V. Veeravalli, and D. L. Jones. "Energy Efficient Detection in Sensor Networks." *IEEE JSAC Special Issue on Sensor Networks*, 23(4): 693-702, April 2005.
- [J33] Y. Liang and V. V. Veeravalli. "Capacity of Noncoherent Time-Selective Block Fading Channels." *IEEE Transactions on Information Theory*, 50(12):3095-3110, December 2004.
- [J32] A. G. Tartakovsky and V. V. Veeravalli. "General Asymptotic Bayesian Theory of Quickest Change Detection." *SIAM: Theory of Probability and its Applications*, 49(3):538-582, 2004.
- [J31] J.-F. Chamberland and V. V. Veeravalli. "Asymptotic Results for Decentralized Detection in Power Constrained Wireless Sensor Networks." *IEEE JSAC Special Issue on Fundamental Performance Limits of Wireless Sensor Networks*. 22(6):1007-1015, August 2004.
- [J30] J.-F. Chamberland and V. V. Veeravalli. "Decentralized Dynamic Power Control for Cellular CDMA Systems." *IEEE Transactions on Wireless Communications*, 2(3): 549-559, May 2003.
- [J29] A. Mantravadi, V. V. Veeravalli and H. Viswanathan. "Spectral Efficiency of MIMO Multiaccess Systems with Single-user decoding." *IEEE Journal on Selected areas in Communications: Special Issue on MIMO Systems and Applications*, 21(3): 382-394, April 2003.
- [J28] R. Prakash and V. V. Veeravalli. "Locally Optimal Soft Handoff Algorithm." *IEEE Transactions on Vehicular Technology*, 52(2): 347-356, March 2003.
- [J27] J.-F. Chamberland and V. V. Veeravalli. "Decentralized Detection in Sensor Networks." *IEEE Transactions on Signal Processing*, 51(2): 407-416, February 2003. (**IEEE Signal Processing Society 2006 Young Author Best Paper Award.**)
- [J26] A. Mantravadi and V. V. Veeravalli. "Asymptotic analysis of MMSE detection in asynchronous CDMA systems: An equivalence result." *IEEE Transactions on Information theory*, 48(12): 3128-38, December 2002.
- [J25] V. V. Veeravalli and A. Mantravadi. "The Coding-Spreading Tradeoff in CDMA Systems." *IEEE JSAC Special Issue on Multiuser Detection Techniques*, 20(2): 396-408, February 2002.
- [J24] V. V. Veeravalli. "On Performance Analysis for Signaling on Correlated Fading Channels." *IEEE Transactions on Communications*. 49(11): 1879-85, November 2001.
- [J23] A. Mantravadi and V. V. Veeravalli. "Chip-Matched Filtering and Discrete Sufficient Statistics for Asynchronous Band-limited CDMA Systems." *IEEE Transactions on Communications*. 49(8): 1457-67, August 2001.
- [J22] D. R. Brown, M. Motani, V. V. Veeravalli, H. V. Poor and C. R. Johnson. "On the Performance of

Linear Parallel Interference Cancellation.” *IEEE Transactions on Information Theory*. 47(5): 1957-70, July 2001.

[J21] V. V. Veeravalli. “Decentralized Quickest Change Detection.” *IEEE Transactions on Information Theory*. 47(4): 1657-65, May 2001.

[J20] R. Prakash and V. V. Veeravalli. “Adaptive Hard Handoff Algorithms.” *IEEE Journal on Selected Areas in Communications - Wireless Communication Series*. 18(11): 2456 -2464, November 2000.

[J19] V. Dragalin, A. G. Tartakovsky and V. V. Veeravalli. “Multihypothesis Sequential Probability Ratio Tests, Part II: Accurate Expansions for the Expected Sample Size.” *IEEE Transactions on Information Theory*. 46(4): 1366-1383, July 2000.

[J18] V. Tripathi, A. Mantravadi and V. V. Veeravalli. “Channel Acquisition for Wideband CDMA Signals.” *IEEE JSAC special issue on Wideband CDMA*. 18(8): 1483-1494, August 2000.

[J17] A. Mantravadi and V. V. Veeravalli. “Multiple-Access Interference Resistant Acquisition for Band-limited CDMA Systems with Random Sequences.” *IEEE Journal on Selected Areas in Communications – Wireless Communication Series*. 18(7): 1203-1213, July 2000.

[J16] V. Dragalin, A. G. Tartakovsky and V. V. Veeravalli. “Multihypothesis Sequential Probability Ratio Tests, Part I: Asymptotic Optimality.” *IEEE Transactions on Information Theory*. 45(7): 2448-2462, November 1999.

[J15] V. V. Veeravalli and A. Sendonaris. “The Coverage-Capacity Tradeoff in Cellular CDMA Systems.” *IEEE Transactions on Vehicular Technology*. 48(5):1443-1451, September 1999.

[J14] A. Sendonaris, V. V. Veeravalli and B. Aazhang. “Joint Signaling Strategies for Approaching the Capacity of Twisted Pair Channels.” *IEEE Transactions on Communications*. 46(5): 673-685, May 1998.(This work was used in the standardization of HDSL2 second-generation high-bit-rate digital subscriber lines.)

[J13] V. V. Veeravalli. “Sequential Decision Fusion: Theory and Applications.” *Journal of the Franklin Institute*. 336(2): 301-322, February 1999. (**Invited.**)

[J12] V. V. Veeravalli and O. E. Kelly. “A Locally Optimal Handoff Algorithm for Cellular Communications.” *IEEE Transactions on Vehicular Technology*. 46(3): 603-610, August 1997.

[J11] V. V. Veeravalli and C. W. Baum. “Hybrid Acquisition of Direct Sequence CDMA Signals.” *International Journal of Wireless Information Networks*, 3(1): 55-65, January, 1996.

[J10] V. V. Veeravalli and C. W. Baum. “Asymptotic Efficiency of a Sequential Multihypothesis Test.” *IEEE Transactions on Information Theory*, 41(6): 1994-1997, November 1995.

[J9] C. W. Baum and V. V. Veeravalli. “A Sequential Procedure for Multihypothesis Testing.” *IEEE Transactions on Information Theory*, 40(6): 1994-2007, November 1994. (**1996 IEEE Browder J. Thompson Award.**)

[J8] V. V. Veeravalli, T. Başar and H. V. Poor. “Decentralized Sequential Detection with Sensors Performing Sequential Tests.” *Journal on Mathematics of Control Signals and Systems*, 7(4): 292-305, December 1994.

[J7] V. V. Veeravalli, T. Başar and H. V. Poor. “Minimax Robust Decentralized Detection.” *IEEE Transactions on Information Theory*, 40(1): 35-40, January 1994.

[J6] V. V. Veeravalli, T. Başar and H. V. Poor. “Decentralized Sequential Detection with a Fusion Center Performing the Sequential Test.” *IEEE Transactions on Information Theory*, 39(2): 433-442, March 1993.

[J5] V. V. Veeravalli. “Comments on Decentralized Sequential Detection.” *IEEE Transactions on Information Theory*, 38(4):1428-1429, July 1992.

[J4] V. V. Veeravalli and H. V. Poor. “Quadratic Detection of Signals with Drifting Phase.” *Journal of the Acoustical Society of America*, 89(2): 811-819, February 1991.

[J3] R. R. Katti, V. V. Veeravalli, B. V. K. Vijaya Kumar and M. H. Kryder. “Model for Demagnetization-Induced Noise in Thin-Film Magnetic Recording Media.” *IEEE Transactions on Magnetics*, 24(4): 2150-

2158, July 1988.

[J2] V. V. Veeravalli, R. R. Katti, B. V. K. Vijaya Kumar and M. H. Kryder. "Time-domain Model for Noise from Particulate Recording Media." *Journal of Applied Physics*, 61(8-IIB): 4034-4036, April 1987.

[J1] B. V. K. Vijaya Kumar and V. V. Veeravalli. "Approximate Lower Bound for the SNR of Matched Filters." *Journal of the Franklin Institute*, 324(1): 139-147, January 1987.

### Conference Publications and Presentations

[C87] J. Fuemmeler and V.V. Veeravalli. "Smart Sleeping Strategies for Localization and Tracking in Sensor Networks." In *Proc. 40th Asilomar Conference on Signals, Systems, and Computers*, Monterey, CA, November 2006. **(Invited.)**

[C86] J. Chen and V. V. Veeravalli. "Capacity Results for Block-Stationary Gaussian Fading Channels." In *Proc. IEEE ITISIT*, Seattle, WA, June 2006.

[C85] V. V. Veeravalli. "System-Theoretic Foundations for Sensor Networks." IWWAN, New York, NY, June 2006. **(Invited Keynote.)**

[C84] V. V. Veeravalli. "Smart Sleeping Policies for Wireless Sensor Networks." NSF Workshop on Future Directions in Networked Sensing, Boston, MA, May 2006. **(Invited.)**

[C83] V. V. Veeravalli and J. Fuemmeler. "Efficient Tracking in a Network of Sleepy Sensors." In *Proc. IEEE ICASSP*, Toulouse, France, May 2006. **(Invited.)**

[C82] C. Lin and V. V. Veeravalli. "Optimal Linear Dispersion Codes for Correlated MIMO Channels." In *Proc. CISS*, Princeton, NJ, March 2004.

[C81] V. V. Veeravalli and S. P. Meyn. "Asymptotic Robust Hypothesis Testing Based on Moment Classes." In *Proc. UCSD ITA Inaugural Workshop*, San Diego, CA, February 2006. **(Invited.)**

[C80] V. V. Veeravalli, A. Visvanathan and J. Fuemmeler. "Tracking with Sleepy Sensors" In *Proc. 39th Asilomar Conference on Signals, Systems, and Computers*, Monterey, CA, November 2005. **(Invited.)**

[C79] V. V. Veeravalli. "Design of Sensor Systems with Fusion for Detection Applications." Netted Sensors (NS) Workshop, McLean, VA, October 2005. **(Invited.)**

[C78] A. Visvanathan and V. V. Veeravalli. "Sleeping Policies for Energy Efficient Tracking in Sensor Networks." In *IEEE Proc. Statistical Signal Processing Workshop*, Bordeaux, France, July 2005. **(Invited.)**

[C77] Y. Liang and V. V. Veeravalli. "Cooperative relay broadcast channels." In *Proc. IEEE WirelessCom, Symposium on Information Theory*, Hawaii, June 2005. **(Invited.)**

[C76] Y. Liang and V. V. Veeravalli. "Distributed optimal resource allocation for fading relay broadcast channels." In *Proc. IEEE International Workshop on Signal Processing Advances for Wireless Communications (SPAWC'05)*, New York, NY, June 2005.

[C75] W. Zha and V. V. Veeravalli. "Analysis of Ricean MIMO Channels Based on A Virtual Channel Representation." In *Proc. IEEE ICASSP*, Philadelphia, PA, March 2005.

[C74] J.-F. Chamberland and V. V. Veeravalli. "How Dense Should a Sensor Network be for Detection Applications?" In *Proc. IEEE ICASSP*, Philadelphia, PA, March 2005. **(Invited.)**

[C73] Y. Liang and V. V. Veeravalli. "Resource Allocation for Wireless Relay Channels." In *Proc. 38th Asilomar Conference on Signals, Systems, and Computers*, Monterey, CA, November 2004. **(Invited.)**

[C72] J.-F. Chamberland and V. V. Veeravalli. "Design of Sensor Networks for Detection Applications via Large Deviation Theory." In *Proc. IEEE Information Theory Workshop*, San Antonio, TX, October 2004.

[C71] S. Meyn, V. V. Veeravalli and C. Pandit. "Extremal Distributions in Information Theory and Hypothesis Testing." In *Proc. IEEE Information Theory Workshop*, San Antonio, TX, October 2004. **(Invited.)**

[C70] J.-F. Chamberland and V. V. Veeravalli. "Decentralized Detection in Wireless Sensor Systems with Dependent Observations." In *Proc. International Conference on Computing, Communications and Control*

*Technologies (CCCT)*, Austin, TX, August 2004. **(Invited.)**

[C69] J.-F. Chamberland and V. V. Veeravalli. “Adaptive Signaling Schemes for Detection in Wireless Sensor Networks.” In *Proc. IEEE ISIT*, Chicago, IL, June 2004.

[C68] Y. Liang and V. V. Veeravalli. “The Impact of Relaying on the Capacity of Broadcast Channels.” In *Proc. IEEE ISIT*, Chicago, IL, June 2004.

[C67] C. Pandit, S. Meyn and V. V. Veeravalli. “Asymptotic Robust Neyman-Pearson Testing Based on Moment Classes.” In *Proc. IEEE ISIT*, Chicago, IL, June 2004.

[C66] J.-F. Chamberland and V. V. Veeravalli. “The Impact of Fading on Decentralized Detection in Power Constrained Wireless Sensor Networks.” In *Proc. IEEE ICASSP*, Montreal, Canada, May 2004. **(Invited.)**

[C65] Y. Liang and V. V. Veeravalli. “Gaussian Frequency Division Relay Channels: Optimal Bandwidth Allocation and Capacity.” In *Proc. CISS*, Princeton, NJ, March 2004.

[C64] Y. Liang and V. V. Veeravalli. “Correlated MIMO Rayleigh Fading Channels: Capacity and Optimal Signaling.” In *Proc. 37th Asilomar Conference on Signals, Systems, and Computers*, Monterey, CA, November 2003.

[C63] R. Prakash and V. V. Veeravalli. “The Effect of Service Variability on Centralized Wireless Systems.” In *Proc. 2nd IASTED International Conference on Communications, Internet, & Information Technology (CIIT 03)*, Scottsdale, Arizona, November 2003. **(Invited.)**

[C62] J.-F. Chamberland and V. V. Veeravalli. “The Art of Sleeping in Wireless Sensing Systems.” In *Proc. IEEE Workshop on Statistical Signal Processing*, St. Louis, MO, September 2003. **(Invited.)**

[C61] S. Appadwedula, D. L. Jones and V. V. Veeravalli. “Energy-Efficient Detection in Sensor Networks.” In *Proc. IEEE Fusion Conference*, Cairns, Australia, July 2003. **(Invited.)**

[C60] V. V. Veeravalli and A. G. Tartakovsky. “Quickest Change Detection in Distributed Sensor Systems.” In *Proc. IEEE Fusion Conference*, Cairns, Australia, July 2003. **(Invited.)**

[C59] V. V. Veeravalli, A. M. Sayeed and Y. Liang. “Asymptotic Capacity of Correlated MIMO Rayleigh Fading Channels via Virtual Representation.” In *Proc. IEEE ISIT 2003*, Yokohama, Japan, June-July 2003.

[C58] R. Prakash and V. V. Veeravalli. “The Impact of Fading on Wireless Systems with Incremental Redundancy.” In *Proc. IEEE ISIT 2003*, Yokohama, Japan, June-July 2003.

[C57] J.-F. Chamberland and V. V. Veeravalli. “Asymptotic Results for Power Constrained Wireless Sensor Networks.” In *Proc. IEEE ISIT 2003*, Yokohama, Japan, June-July 2003.

[C56] V. V. Veeravalli and R. Prakash. “Uplink Analysis of Cellular Packet Data Systems with Multiantenna Reception.” In *Proc. IEEE International Workshop on Multimedia Signal Processing*, St. Thomas, US Virgin Islands, December 2002. **(Invited.)**

[C55] A. M. Sayeed and V. V. Veeravalli. “Essential Degrees of Freedom in Time and Frequency Selective MIMO Channels.” In *Proc. IEEE WPMC*, Honolulu, Hawaii, October 2002. **(Invited.)**

[C54] A. G. Tartakovsky and V. V. Veeravalli. “Asymptotics of Quickest Change Detection Procedures Under a Bayesian Criterion.” In *Proc. Information Theory Workshop*, Bangalore, India, October 2002. **(Invited.)**

[C53] A. M. Sayeed and V. V. Veeravalli. “The Essential Degrees of Freedom in Space-Time Fading Channels.” In *Proc. PIMRC’02*, Lisbon, Portugal, September 2002.

[C52] R. Prakash and V. V. Veeravalli. “Traffic Load Based Reverse Link Power Allocation for Cellular Packet Data Systems.” In *Proc. IEEE Vehicular Technology Conference*, Vancouver, BC, September 2002.

[C51] V. V. Veeravalli and R. Prakash. “Design and Analysis of Cellular Packet Data Systems Using Time-Scale Separation.” In *Proc. IEEE International Symposium on Advances in Wireless Communications (ISWC)*, Victoria, BC, September 2002. **(Invited.)**

[C50] S. Appadwedula, V. V. Veeravalli, and D. L. Jones. “Locally-Optimum and Robust Decentralized

- Detection with Censoring Sensors.” In *Proc. IEEE Fusion 2002*, Annapolis, MD, July 2002. **(Invited.)**
- [C49] A. G. Tartakovsky and V. V. Veeravalli. “Change-Point Detection in Multichannel and Distributed Systems With Applications.” In *Proc. IEEE Fusion 2002*, Annapolis, MD, July 2002. **(Invited.)**
- [C48] R. Prakash and V. V. Veeravalli. “A Time-Scale Separation Technique for the Analysis of Random Access Systems with Incremental Redundancy.” In *Proc. IEEE ISIT 2002*, Lausanne, Switzerland, June-July 2002.
- [C47] Y. Liang and V. V. Veeravalli. “Capacity of Noncoherent Time-Selective Block Rayleigh Flat-Fading Channels.” In *Proc. IEEE ISIT 2002*, Lausanne, Switzerland, June-July 2002.
- [C46] V. V. Veeravalli and A. G. Tartakovsky. “Asymptotic Analysis of Bayesian Quickest Change Detection Procedures.” In *Proc. IEEE ISIT 2002*, Lausanne, Switzerland, June-July 2002.
- [C45] A. Mantravadi and V. V. Veeravalli. “Sum Capacity of CDMA Systems with Multiple Transmit Antennas.” In *Proc. IEEE ISIT 2002*, Lausanne, Switzerland, June-July 2002.
- [C44] R. Prakash and V. V. Veeravalli. “Wireless Packet Data Systems with Incremental Redundancy – Uplink Analysis.” In *Proc. CISS 2002*, Princeton, NJ, March 2002.
- [C43] J.-F. Chamberland and V. V. Veeravalli. “Decentralized Detection in Wireless Sensor Networks.” In *Proc. CISS 2002*, Princeton, NJ, March 2002.
- [C42] A. Mantravadi, V. V. Veeravalli and H. Viswanathan. “Design Considerations for the Uplink of Cellular Systems with Multiple Antennas.” In *Proc. 35th Asilomar Conference on Signals, Systems, and Computers*, Monterey, CA, November 2001. **(Invited.)**
- [C41] V. V. Veeravalli. “Wideband Multiantenna Wireless Channels: Statistical Modeling, Analysis and Simulation.” Tutorial at *IEEE Vehicular Technology Conference*, Atlantic City, NJ, October 2001. **(Invited.)**
- [C40] J.-F. Chamberland and V. V. Veeravalli. “Decentralized Dynamic Power Control for Cellular Spread Spectrum Systems.” In *Proc ITCOM Conference on Modeling and Design of Wireless Networks* Denver, August 2001. **(Invited.)**
- [C39] A. Mantravadi and V. V. Veeravalli. “Asymptotic analysis of MMSE detection in asynchronous CDMA systems: An equivalence result.” In *Proc. IEEE ISIT 2001*, Washington DC, June 2001.
- [C38] A. Mantravadi, V. V. Veeravalli and H. Viswanathan. “Design Aspects of Multiantenna CDMA systems with random sequences.” In *Proc. CISS 2001*, Baltimore, MD, March 2001.
- [C37] R. Prakash, V. V. Veeravalli and V. Tripathi. “Analysis of Code Division Random Multiple Access Systems with Packet Combining.” In *Proc. 34th Asilomar Conference on Signals, Systems, and Computers*, Monterey, CA, November 2000. **(Invited.)**
- [C36] A. Mantravadi and V. V. Veeravalli. “The Coding-Spreading Trade-off for CDMA Systems with Frequency Selective Fading.” Presented in the new results session at *IEEE ISIT 2000*, Sorrento, Italy, June 2000.
- [C35] M. Motani, V. V. Veeravalli and C. Heegard. “On Capacity and Spreading in CDMA Systems.” In *Proc. IEEE ISIT 2000*, Sorrento, Italy, June 2000.
- [C34] J.-F. Chamberland and V. V. Veeravalli. “Optimal Dynamic Power Control for CDMA Systems.” In *Proc. IEEE ISIT 2000*, Sorrento, Italy, June 2000.
- [C33] V. Tripathi, A. Mantravadi and V. V. Veeravalli. “MAI Resistant Channel Acquisition for Wideband CDMA Signals.” In *Proc. IEEE VTC2000-Spring*, Tokyo, Japan, May 2000.
- [C32] R. Prakash and V. V. Veeravalli. “Locally Optimal Soft Handoff Algorithm.” In *Proc. IEEE VTC2000-Spring*, Tokyo, Japan, May 2000.
- [C31] M. Motani and V. V. Veeravalli. “The Coding-Spreading Tradeoff in CDMA Systems with Convolutional Codes and Direct Sequence Spreading.” In *Proc. CISS 2000*, Princeton, NJ, March 2000. **(Invited.)**
- [C30] M. Motani, V. V. Veeravalli and C. Heegard. “The Capacity Loss Due to Spreading.” *Proc. 2nd Inter-*

*national Conference on Information, Communications and Signal processing (ICICS)*, Singapore, December 1999.

[C29] A. Mantravadi and V. V. Veeravalli. "On Discrete Sufficient Statistics for Acquisition in Band-limited CDMA Systems." *Proc. 27th Annual Allerton Conference*, Monticello, IL, September 1999.

[C28] V. V. Veeravalli. "The Coding-Spreading Tradeoff in CDMA Systems." *Proc. 27th Annual Allerton Conference*, Monticello, IL, September 1999. **(Invited.)**

[C27] V. V. Veeravalli. "Time Varying Channel Models for Wireless Systems." Tutorial at *IEEE Vehicular Technology Conference*, Houston, TX, May 1999. **(Invited.)**

[C26] V. V. Veeravalli and A. Mantravadi. "Performance Analysis for Diversity Reception of Linearly Modulated Signal over Correlated Fading Channels." *Proc. 1999 Vehicular Technology Conference*, Houston, TX, May 1999.

[C25] R. Prakash and V. V. Veeravalli. "Adaptive Hard Handoff Algorithms." *Proc. 1999 Vehicular Technology Conference*, Houston, TX, May 1999.

[C24] A. Mantravadi and V. V. Veeravalli. "On Discrete Sufficient Statistics for Detection in Asynchronous Band-limited CDMA Systems." *Proc. 33rd Annual Conference on Information Sciences and Systems*, Baltimore, MD, March 1999.

[C23] V. V. Veeravalli, A. G. Tartakovsky and V. Dragalin. "Multihypothesis Sequential Probability Ratio Tests." *Proc. 1999 Information Theory Workshop on Detection, Estimation, Classification and Imaging (DECI)*, Santa Fe, NM, February, 1999. **(Invited.)**

[C22] R. Prakash and V. V. Veeravalli. "Accurate Performance Analysis of Hard Handoff Algorithms." *Proc. 9th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, Boston, MA, September 1998.

[C21] V. V. Veeravalli, A. G. Tartakovsky and V. Dragalin. "Asymptotic Analysis of Multihypothesis Sequential Probability Ratio Tests." *Proc. 1998 IEEE International Symposium on Information Theory*, Boston, MA, August, 1998.

[C20] A. Mantravadi and V. V. Veeravalli. "Multiple-Access Interference Resistant Acquisition for CDMA Systems with Long Spreading Sequences." *Proc. 32nd Annual Conference on Information Sciences and Systems*, Princeton, NJ, March 1998.

[C19] V. V. Veeravalli. "The Role of Coding in CDMA Systems with Multiuser Detection." *Proc. 1997 IEEE International Conference on Personal Wireless Communications (ICPWC'97)*, Mumbai, India, December 1997.

[C18] A. Sendonaris and V. V. Veeravalli. "The Capacity-Coverage Tradeoff in CDMA Systems with Soft Handoff." *Proc. 1997 Asilomar Conference on Signals, Systems, and Computers*, Monterey, CA, November 1997.

[C17] V. V. Veeravalli. "Further Results on Decentralized Change Detection." *Proc. 1997 IEEE International Symposium on Information Theory*, Ulm, Germany, June-July, 1997.

[C16] V. V. Veeravalli, A. Sendonaris and N. Jain. "CDMA Coverage, Capacity and Pole Capacity." *Proc. 47th IEEE Vehicular Technology Conference*, Phoenix, AZ, May 1997.

[C15] V. V. Veeravalli. "Sequential Decision Fusion: Theory and Applications." *Proc. Workshop on Foundations of Information/Decision Fusion: Applications to Engineering Problems*, pp. 200-205, Washington, D.C., August 1996.

[C14] V. V. Veeravalli and B. Aazhang. "On the Coding-Spreading Tradeoff in CDMA Systems." *Proc. 30th Annual Conference on Information Sciences and Systems*, pp. 1136-1141, Princeton, NJ, March 1996.

[C13] M. Landolsi, V. V. Veeravalli and N. Jain. "New Results on the Reverse Link Capacity of CDMA Cellular Networks." *Proc. 46th IEEE Vehicular Technology Conf.*, pp. 1462-1466, Atlanta, GA, April 1996.

[C12] A. Sendonaris, V. V. Veeravalli and B. Aazhang, "Signaling Strategies for Maximizing the Capacity

- on Twisted Pairs.” *Proc. 33rd Annual Allerton Conference*, Monticello, IL, October 1995.
- [C11] O. E. Kelly and V. V. Veeravalli. “A Locally Optimal Handoff Algorithm.” *Proc. 6th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, 809-813, Toronto, Canada, September 1995.
- [C10] V. V. Veeravalli. “Decentralized Quickest Change Detection.” *Proc. 1995 IEEE International Symposium on Information Theory*, p. 294, Whistler, BC, Canada, September 1995.
- [C9] V. V. Veeravalli and C. W. Baum. “Sequential Multihypothesis Testing with Nonuniform Costs and Applications in Hybrid Serial Search.” *Proc. 1994 IEEE International Symposium on Information Theory*, p. 256, Trondheim, Norway, June 1994.
- [C8] C. W. Baum and V. V. Veeravalli. “Hybrid Acquisition in Direct Sequence CDMA Systems.” *Proc. 1994 IEEE International Conference on Communications*, 1433-1437, New Orleans, LA, May 1994.
- [C7] V. V. Veeravalli and C. W. Baum. “New Results in M-ary Sequential Hypothesis Testing.” *Proc. 27th Annual Conference on Information Sciences and Systems*, Baltimore, MD, March 1993.
- [C6] Y. C. Ho, V. V. Veeravalli and A. Lin. “Ordinal Optimization: Concepts and Results.” *SIAM Conference on Simulation and Computational Probability*, San Francisco, CA, August 1993.
- [C5] V. V. Veeravalli, H. V. Poor and T. Başar. “Decentralized Sequential Detection with a Fusion Center Performing the Sequential Test.” *Proc. American Control Conf.*, pp. 1177-1181, Chicago, IL, June 1992.
- [C4] V. V. Veeravalli, T. Başar and H. V. Poor. “Minimax Robust Decentralized Detection.” *Proc. 26th Annual Conference on Information Sciences and Systems*, Princeton, NJ, March 1992.
- [C3] V. V. Veeravalli, T. Başar and H. V. Poor. “The Decentralized Wald Problem with a Nonlinear Penalty on Stopping Times.” *Proc. 25th Annual Conf. Inform. Sciences and Systems*, Baltimore, MD, March 1991.
- [C2] V. V. Veeravalli and H. V. Poor. “Quadratic Detection of Lorentzian Signals.” In *Proc. 24th Annual Conference on Information Sciences and Systems*, Princeton, NJ, March 1990.
- [C1] S. V. Veeravalli and V. V. Veeravalli. “Higher Order Spectra of Turbulent Velocity Fluctuations.” *Proc. 42nd Annual Meeting of the Division of Fluid Dynamics of the American Physical Society*, 1989.

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## **PATENTS**

- V. V. Veeravalli, A. Sendonaris, N. Jain and S. M. Peddy. “Method and Apparatus for designing Soft Handoff Regions in a Communications System.” Awarded December 26, 2000. U.S. Patent No. 6,167,035
- V. V. Veeravalli, A. Sendonaris, and N. Jain. “Accurate Calculations of the Probability Of Outage for the CDMA Reverse Link.” Awarded August 1, 2000. U.S. Patent No. 6,097,956.
- C. Yu, S. Subramanian, A. Sendonaris, S. Lin, M. Landolsi, N. Jain, S. Madhavapeddy, S. Tseng, and V. V. Veeravalli. “Method for optimizing cell-site placement.” Awarded July 25, 2000. U.S. Patent No. 6,094,580.
- A. Sendonaris, V. V. Veeravalli, M. Landolsi and A. Daraiseh. “Forward Link Power Control in a Cellular Radiotelephone System.” Awarded July 4, 2000. U.S. Patent No. 6,085,106.

## **Pending:**

- A. Sayeed and V.V. Veeravalli. “Method and System for Modeling a Wireless Communication Channel.” Applied August, 2003.

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## EXTERNAL RESEARCH FUNDING

### **Current Research Proposals**

- “Spatial-Temporal Nonlinear Filtering with Applications to Information Assurance and Counter Terrorism”. Funded by the *ARO FY06 MURI Program on Spatial-Temporal Event Pattern Recognition*, May 2006 – May 2011. (Led by Prof. Boris Rozovsky, USC.)
- “Design and Analysis of Sensor Networks for Statistical Inference Applications.” Funded by the *Motorola Communications Center*, University of Illinois. September, 2005 – August 2008.
- “Wireless Wind Tunnel: A Testbed for Experimental Evaluation of Wireless Networks.” Funded by the *National Science Foundation*, September, 2004 – August, 2006. (With Profs. N. Vaidya, J. Bernhard, R. Iyer, and P.R. Kumar.)
- “Communication over Dispersive Wireless Channels: Theory and Methods Based on Physical Principles.” Funded by the *National Science Foundation*, September, 2004 – August, 2007. (With Prof. A. Sayeed, U. Wisconsin.)
- Played a lead role in obtaining a **\$3.4 million** award from the *Vodafone-US Foundation* to fund graduate and undergraduate fellowships in wireless communications at the University of Illinois from 2003-2008.
- “New Techniques for Optimizing the Quality and Capacity of Wireless Communication Systems.” Funded by *National Science Foundation CAREER program and PECASE award*, July 1, 1998 – June 30, 2006.
- “Signal Design for Broadband Multiantenna Wireless CDMA Systems.” Funded by *Lucent Technologies*. June 2002 – .

### **Past Research Proposals**

- “An Integrated Exploration of Wireless Network Communication.” Funded by the *National Science Foundation* through the ITR program, August 1, 1999 – December 31, 2004. (With several CSL, U. Illinois faculty.)
- “Design Principles for Wideband Wireless Communications.” Funded by the *National Science Foundation*, March 1, 2000 – August 31, 2003. (With Prof. T. Berger, Cornell University).
- “Research at the Frontiers of the Physical Layer.” Funded by *National Science Foundation*, September 1, 1998 – August 31, 2002. (With Dr. C. Heegard.)
- “Decentralized Dynamic Decision Making and its Applications to Wireless Communications.” Funded by the *Office of Naval Research*. June 1, 1997 – August 31, 2000.
- “New Sequential Techniques for Code Acquisition in Wireless CDMA Systems.” Funded by the *National Science Foundation*. January 1, 1997 – December 31, 2000.
- “Wideband Multimedia Wireless Communications.” Funded by *Lockheed Martin Co.*, May 20, 1999 – August 31, 2000.
- “Radio Resource Management for Third Generation CDMA Systems.” Funded by *Nortel External Research*. April 20, 1998 – July 25, 2000.
- “Capacity, Coverage and Soft Handoff Analysis for Cellular CDMA Systems.” Funded by *Nortel External Research*. December 10, 1996 – December 10, 1997.

### **Equipment Grants and Donations**

- “Companion 200 pico-cellular communication system testbed for WiSE laboratory.” *Nortel External Research*, 1998.
- “Arbitrary Waveform Generator and High Speed Digitizing Oscilloscope.” *Tektronix Foundation*, 1999.
- “Equipment grant for WiSE laboratory” *AT&T Foundation*, 1996.
- Wireless LAN equipment for the Cornell ROBOCUP project. *Raytheon*, 2000.

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## ADVISING

### *Postdoctoral Associates*

- **Vasanthan Raghavan**, Ph.D. U. Wisconsin, Madison, August 2006 -
- **Jun Chen**, Ph.D. Cornell University. September 2005 - July 2006. Now with McMaster University.
- **Wei Zha**, Ph.D. Queens University. December 2003 - January 2005. Now with Schlumberger.

### *Ph.D. Students*

- **Che Lin**. Currently working on Ph.D. thesis. Expected completion date: June 2008.
- **Jason Fuemmeler**. Currently working on Ph.D. thesis. Expected completion date: December 2007.
- **Yingbin (Grace) Liang**. Ph.D., August 2005. Thesis title: "Multiuser Communications with Relaying and User Cooperation." Now a postdoctoral fellow at Princeton University.
- **Jean-Francois Chamberland**. Ph.D., August 2004. Ph.D. thesis title: "Design of Sensor Networks for Detection Applications via Large Deviation Theory." Now with Texas A&M University.
- **Rajat Prakash**. Ph.D., October 2003. Ph.D. thesis title: "Centralized Wireless Systems with User Arrivals and Departures." Now with Qualcomm, San Diego, CA.
- **Swaroop Appadwedulla**. Ph.D., May 2003. (Co-advised with Douglas Jones.) Thesis title: "Energy-Efficient Sensor Networks for Detection Applications." Now with Lincoln Labs, Boston, MA.
- **Ashok Mantravadi**. Ph.D., January, 2002, Cornell University. Ph.D. thesis title: "Analysis and Design of Wideband Multiantenna CDMA Systems." M.S., January, 1999, Cornell University. M.S. thesis title: "On Acquisition and Detection in Asynchronous Band-limited CDMA Systems." Now with Qualcomm, San Diego, CA.
- **Mehul Motani**. Ph.D., August 2000, Cornell University. (Co-advised with Chris Heegard.) Thesis title: "Information Theory and Coding for CDMA Systems." Now with National University of Singapore.

### *M.S. Students*

- **Sundhar Ram Srinivasan**. Currently working on M.S. thesis.
- **Venkata Annapureddy**. Currently working on M.S. thesis.
- **Jayakrishnan Unnikrishnan**. Currently working on M.S. thesis.
- **Arun Visvanathan**. M.S., August 2005. Thesis title: "Sleeping Policies for Energy Efficient Tracking in Sensor Networks." Now with Airvana, Boston, MA.
- **Jason Fuemmeler**. M.S., October, 2004. Thesis title: "Power Control for Ad Hoc Wireless Networks."
- **Batu Sat**. M.S., October 2003. Thesis title: "Grouping Strategies for Cellular CDMA Systems."
- **K. Chaitanya Reddy**. M.S., May, 2003. Thesis title: "Coding Spreading Tradeoff for Multiple Antenna Systems Using Convolutional Codes." Now with Qualcomm, San Diego, CA.
- **Jean-Francois Chamberland**. M.S., August 2000, Cornell University. Thesis title: "Analysis and Design of Power Control Algorithms for CDMA Systems." Now with Texas A&M University.
- **Rajat Prakash**. M.S., August 1999, Cornell University. Thesis title: "Analysis and Design of Handoff Algorithms." Now with Qualcomm, San Diego, CA.
- **Ashok Mantravadi**. M.S., January, 1999, Cornell University. Thesis title: "On Acquisition and Detection in Asynchronous Band-limited CDMA Systems." Now with Qualcomm, San Diego, CA.

***Undergraduate Research Projects (last five years)***

- **Jason Chang.** “Detection of Primary Signal in Cognitive Radio Systems.” Supported by a Vodafone Scholarship, 2006-2007.
- **Jason Ching.** “Queuing Theory and its Applications in Cellular Network Analysis.” Supported by an NSF REU grant. Summer 2003.

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## TEACHING ACTIVITIES

### ***University of Illinois***

- ECE 461 (Fall 2006): Communication Systems II
- ECE 563 (Fall 2005): Information Theory
- ECE 459 (Spring 2003): Communication Systems I
- ECE 561 (Spring 2002, 2006): Detection and Estimation Theory
- ECE 471VV (Spring 2001): Wireless Communication Networks
- ECE 559 (Fall 2000): Communication Systems III

### ***Cornell University***

- EE 467 (Fall 1997, 1998, 1999): Communication Systems 1 (*Introduced by VVV*)
- EE 568 (Spring 1997, 1998, 1999): Mobile Communication Systems (*Introduced by VVV*)
- EE 564 (Fall 1996): Signal Detection and Estimation
- EE 311 (Spring 1998): EE Honors Seminar
- EE 595 (Fall 1996): Wireless Information Technology Seminar

### ***Rice University***

- Elec 630 (Spring 1996): Advanced Topics—Wireless Communications (*Introduced by VVV*)
- Elec 301 (Fall 1994, 1995): Introduction to Signals and Systems
- Elec 535 (Spring 1995): Information and Coding Theory
- Elec 697 (Spring 1995): Information-Theoretic Signal Processing—Graduate seminar course

### ***Nortel Networks***

- Summer 1995: Communication Theory—A detailed overview of information theory, coding theory and modulation, with emphasis on multiple-access communications

### ***City University of New York***

- EE 311 (Spring 1994): Communication Engineering I
- EE 5771 (Fall 1993): Statistical Communication Theory (*Introduced by VVV*)

### ***University of Illinois***

- ECE 461 (Spring 1992): Signal Detection and Estimation

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## INVITED TALKS AT UNIVERSITIES, CONFERENCES AND INDUSTRY (last five years)

- “System-Theoretic Foundations for Sensor Networks.”
  - IWWAN, New York, NY, June 2006. (**Keynote Lecture**)
  - UC Davis, ECE Department Colloquim, October 2006..
- “Smart Sleeping Policies for Wireless Sensor Networks.”
  - NSF Workshop on Future Directions in Networked Sensing, Boston, MA, May 2006
- “Tracking with Sleepy Sensors.”
  - **ICASSP**, Toulouse, France, May 2006.
  - **Michigan Tech. University**, CISSIC Research Seminar, April 2006.
  - **Cornell University**, ECE Department Seminar, April 2006.
  - **McGill University**, Montreal, Canada, ECE Seminar, March 2006.
  - **Asilomar Conference on Signals, Systems, and Computers**, Monterey, CA, November 2005.
- “Asymptotic Robust Hypothesis Testing Based on Moment Classes.”
  - **UCSD ITA Inaugural Workshop**, San Diego, CA, February 2006.
- “Design of Sensor Networks for Statistical Inference Applications.”
  - **Motorola**, Plantations, FL, January 2006.
  - **Imperial College**, London, EE Seminar, November 2005.
- “Design of Sensor Systems with Fusion for Detection Applications.”
  - **Netted Sensors (NS) Workshop**, McLean, VA, October 2005.
  - **MIT**, LIDS Seminar, April 2005.
- “Capacity of MIMO Wireless Channels via Virtual Representation.”
  - **Cambridge University**, ECE Seminar, November 2005.
  - **University of Maryland**, CSHCN Colloquium, December 2004.
  - **University of Texas, Austin**, WNC Seminar, November 2004.
  - **Poytechnic University**, ECE Department Seminar, October 2004.
  - **George Washington University**, EE Department Seminar, September 2004.
- “Resource Allocation for Wireless Relay Channels.”
  - **Asilomar Conference on Signals, Systems, and Computers**, Monterey, CA, November 2004.
- “Extremal Distributions in Information Theory and Hypothesis Testing.”
  - **IEEE Information Theory Workshop**, San Antonio, TX, October 2004.
- “Capacity of MIMO Wireless Channels via Virtual Representation.”
  - **Smart Antenna Workshop**, Stanford University, Palo Alto, CA, July 2004.
- “Decentralized Detection in Wireless Sensor Systems with Dependent Observations.”
  - **International Conference on Computing, Communications and Control Technologies (CCCT)**, Austin, TX, August 2004
- “The Impact of Fading on Decentralized Detection in Power Constrained Wireless Sensor Networks.”
  - **ICASSP**, Montreal, Canada, May 2004.
- “The Effect of Service Variability on Centralized Wireless Systems.”
  - **IASTED International Conference on Communications, Internet, & Information Technology (CIIT 03)**, Scottsdale, Arizona, November 2003
- “Efficient Design of Wireless Sensing Systems for Detection Applications.”
  - **NSF Workshop on Wireless Networked Sensor and Actuator Systems**, CENS, UCLA, September 2003.
  - **SAMSI Sensor Networks Workshop**, Univeristy of North Carolina, October 2003.
- “The Art of Sleeping in Wireless Sensing Systems.”

- **IEEE Workshop on Statistical Signal Processing**, St. Louis, MO, September 2003.
- “Energy-Efficient Detection in Sensor Networks.”
  - **IEEE Fusion Conference**, Cairns, Australia, July 2003.
- “Quickest Change Detection in Distributed Sensor Systems.”
  - **IEEE Fusion Conference**, Cairns, Australia, July 2003.
- “Asymptotic Analysis of Bayesian Quickest Change Detection Procedures.”
  - **Quality and Productivity Research Conference**, IBM, Yorktown Heights, New York, May 2003.
  - **UC Berkeley**, Systems Seminar, June 2003.
- “Uplink Analysis of Cellular Packet Data Systems with Multiantenna Reception.”
  - **IEEE International Workshop on Multimedia Signal Processing**, St. Thomas, US Virgin Islands, December 2002.
- “Multiaccess in Cellular Systems with Multiple Antennas.”
  - **Indian Institute of Technology, Bombay**, EE Seminar, October 2002.
  - **Ambani Institute of Information and Communication Technology**, Ahmedabad, Gujarat, India, EE Seminar, October 2002.
  - **Qualcomm, Inc.** Santa Clara, CA, June 2003.
- “Essential Degrees of Freedom in Time and Frequency Selective MIMO Channels.”
  - **IEEE WPMC**, Honolulu, Hawaii, October 2002.
- “Asymptotics of Quickest Change Detection Procedures Under a Bayesian Criterion.”
  - **IEEE Information Theory Workshop**, Bangalore, India, October 2002.
- “Design and Analysis of Cellular Packet Data Systems Using Time-Scale Separation.”
  - **IEEE International Symposium on Advances in Wireless Communications (ISWC)**, Victoria, BC, September 2002.
- “Change-Point Detection in Multichannel and Distributed Systems With Applications.”
  - **Fusion 2002**, Annapolis, MD, July 2002.
- “Locally-Optimum and Robust Decentralized Detection with Censoring Sensors.”
  - **Fusion 2002**, Annapolis, MD, July 2002.
- “Orthogonalizing Users versus Orthogonalizing Antennas.”
  - **ETH, Zurich**, Switzerland, Graduate Seminar, June 2002.
  - **Eurecom**, Sophia-Antipolis, France, Graduate Seminar, July 2002.
- “Change Detection in Distributed Sensor Systems.”
  - **USC, Center for Applied Mathematics** Seminar, April 2002.
- “Spectral Efficiency of MIMO Multiaccess Systems.”
  - **University of Wisconsin, Madison**, Graduate Seminar, February 2002.
  - **Asilomar Conference** on Signals, Systems, and Computers, November 2001.
- “Multiaccess Techniques for Cellular Systems with Multiple Antennas.”
  - **University of Illinois**, ECE Graduate Seminar, November 2001.
- “Wideband Multiantenna Wireless Channels: Statistical Modeling, Analysis and Simulation.”
  - **Vehicular Technology Conference**, Atlantic City, NJ (*Invited tutorial*), October 2001.
- “Decentralized Dynamic Power Control for Cellular Spread Spectrum Systems.”
  - **ITCOM Conference** on Modeling and Design of Wireless Networks Denver, August 2001.

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## PERSONAL

*Married, US Citizen*