Kanchan G. Vardhe

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OBJECTIVE Seek an internship in the area of communications and signal processing.

EDUCATION

Ph.D. in Electrical Engineering, West Virginia University, U.S.A. **GPA** : 3.92/4.0 (expected) Dec. 2008

Courses: Information Theory, Communication Theory, Linear Algebra, Theory of Statistics, Real Analysis.

Dissertation Theme: Multiuser Cooperative Communications : Protocol Design and Performance Bounds.

M.S. in Electrical Engineering, West Virginia University, U.S.A. **GPA** : 3.92/4.0 Dec. 2005

Courses: Stochastics System Theory, Estimation and Detection Theory, Statistical Signal Processing, Wireless Communication Systems, Coding Theory, Multi-antenna Systems.

Thesis: Cooperative Diversity for the Cellular Uplink: Sharing Strategies, Performance Analysis and Receiver Design

B.E. in Electronics and Telecom. Engineering, University of Pune, India. **GPA** : 3.8/4.0 Aug. 2002

RESEARCH INTERESTS

Cooperative Communications, MIMO systems, Signal processing for communications, Information Theory.

JOURNAL PUBLICATIONS

- K. Vardhe, D. Reynolds, and B. D. Woerner, "Joint power allocation and relay selection for multiuser cooperative communication," submitted to *IEEE Transactions on Wireless Communications- Letters*, Nov. 2007.
- K. Vardhe, D. Reynolds, and M. C. Valenti, "The performance of mulit-user cooperative diversity in an asynchronous CDMA uplink," to appear *IEEE Transactions on Wireless Communications* (accepted July 13, 2007).
- K. Vardhe and D. Reynolds, "User Cooperation in an Asynchronous Cellular Uplink", *Signal Processing Journal, Elsevier*, July 2007.

CONFERENCE PUBLICATIONS

- K. Vardhe, D. Reynolds, and M. C. Valenti, "Outage probability of a multi-user cooperation protocol in an asynchronous CDMA cellular uplink," in *Proc. Conf. on Info. Sci. and Sys. (CISS)*, (Baltimore, MD), Mar. 2007.
- K. Vardhe and D. Reynolds, "The performance of Space-Time Coded Cooperative Diversity in an Asynchronous Cellular Uplink," in *Proc. IEEE Military Commun. Conf. (MILCOM)*, (Washington DC), Oct. 2006.

HONORS & AWARDS

- Lane Graduate Fellowship, West Virginia University, USA, 2005-2008.
- National Merit Scholarship, Government of India, 1998

PROFESSIONAL EXPERIENCE

Graduate Research Assistant May 2006 - Present

- Proposed a multi-user decode-and-forward cooperative diversity protocol that operates in an asynchronous CDMA cellular uplink while relaxing the inter-user orthogonality constraint.

- Analyzed the information-outage probability performance of the proposed protocol under three special cases : under-loaded CDMA , fully loaded CDMA and overloaded CDMA configuration.
- Examined the effect of modulation constraints (assumption of uniform input probability) on the information-outage probability performance of the proposed DF multi-user sharing scheme under diversity combining.
- Developed a strategy to minimize the total transmit power in a decode-and-forward (DF) user cooperative uplink, such that each user satisfies its quality-of-service (QoS), data rate. The solution to the optimization problem in DF cooperative uplink leads to an iterative algorithm that jointly performs relay selection for cooperation and optimally allocates source and the relay powers.

Graduate Teaching Assistant August 2004 -May 2006
Circuits and Systems Lab, West Virginia University.

Supervised labs for the Electrical Circuits courses, presented guest lectures for the Electrical Circuits and the Control Systems course.

Masters Thesis Research

- Proposed a practical, cooperative decode-and-forward sharing scheme that works for any number of users in asynchronous environments using orthogonal or non-orthogonal space-time block codes or even using delay diversity technique. The system under consideration makes use of CDMA.
- Designed a practical adaptive pseudo-linear base-station receiver that extracts full spatial diversity for uplink cooperative communications. Unlike usual MMSE receiver, our base-station receiver incorporates a non-linear complex conjugation receiver front-end in addition to linear MMSE filter. The complex conjugation step is critical to obtaining full diversity with linear reception. Our scheme outperforms Sendonaris et al. protocol and conventional no-sharing under low-complexity linear joint multiuser detection and space-time decoding.

PROFESSIONAL SERVICES

- Peer reviewer for VTC 2005, 2007-Fall, SPAWC 2005, MILCOM 2005, WCNC 2006.
- Peer reviewer for IEEE Transactions on Wireless Communications.
- Peer reviewer for IEEE Transactions on Signal Processing.
- Peer reviewer for IEEE Signal Processing Letters.
- Peer reviewer for EURASIP Journal on Applied Signal Processing.

SOFTWARE SKILLS

Matlab, C, LaTeX, Macromedia Dreamweaver, M.S. Office.

PROJECTS

- Simulation of adaptive MMSE equalizer and LMS equalizer in block fading multipath (ISI) channels.
- Simulation of QPSK-modulated CDMA in AWGN and block fading channels using matched filter detector, decorrelating multiuser detector, and MMSE multiuser detector.
- Simulation of blind sequential adaptive detection in BPSK-modulated non-fading AWGN channels.
- Simulation of diversity techniques including Selection diversity, Maximum Ratio Combining, Space-Time Block Coding in fading channels.
- Hard and Soft-decision Viterbi decoding for the convolutional code used in GSM.

REFERENCES

Available upon request