

Joydeep Acharya

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Education

PhD
GPA: 3.9/4.0
May 05 – Present

WINLAB (Dept of EE), Rutgers, State University of New Jersey.
Topic: Resource Allocation and Physical Layer Synchronization Aspects of Cognitive Radios based on Dynamic Spectrum Access

Masters
GPA: 3.89/4.0
Sept 02 – May 05

WINLAB (Dept of EE), Rutgers, State University of New Jersey.
Topic: Two Dimensional Spreading for Doubly Dispersive Channels

BTech. (Hons)
GPA: 8.3/10
Sept 97 – May 01

Dept of Electronics and Communications, Indian Institute of Technology, Kharagpur
Topic: Multicarrier Modulation for wireless and DSL applications

Skills

Languages	C, familiar with Java and C++
HDL	Verilog
Simulators	SPW ,MATLAB/Simulink

Work Experience

June '07 – June '08	Intern at Wireless Communications Theory Research, Bell Labs, Holmdel NJ
June '06 – Aug' 06	Intern at Corporate R&D, Qualcomm Inc. San Diego
Sept '03 - Present	Graduate Assistant, WINLAB, Rutgers University
Sept '02 – Sept '03	Teaching Assistant, Dept. of Electrical Engg., Rutgers University
May '01 – June '02	Research Assistant at GSS School of Telecomm, IIT Kharagpur
May '00 – July '00	Intern at Interim Test Range, Defense Research & Development, (ITR), DRDO, Govt of India
May '99 – July '99	Intern at Center for Advanced Technology, Govt of India

Research Projects Undertaken

Intern at Wireless Communications Theory Research, Bell Labs, Holmdel NJ

- Formulated the timing acquisition problem for non-contiguous OFDM transmissions, which arise in secondary usage of spectrum
- Developed the optimal algorithm for frequency flat channels and low complexity, sub-optimal algorithms both for frequency flat and frequency selective channels.

Intern at Corporate R&D, Qualcomm Inc. San Diego

- Studied the problem of user cooperation in a cellular environment
- Based on path loss models in a circular cell, derived regions of cooperation
- Studied possible signaling and protocol level implementation of user cooperation

Graduate Assistant at WINLAB, Rutgers University

Dynamic Spectrum Allocation Methods for Utility and Profit maximization

- Developed an analytical framework for dynamic spectrum allocation based on spectrum pricing and limited user cooperation for a multi user, multi Service Provider scenario
- Studied the pricing strategies when profit maximizing Service Providers allocates spectrum to users in the downlink
- Analyzed effects of resource and technology costs and operator competition in dynamic spectrum allocation

PHY Layer development of Mobile Infostation Network Technology

- Joint project with Mayflower Inc. to develop an infostation based high speed data network system
- Designed the PHY layer specs based on MIMO-OFDM 802.11n technology

Analysis of Two Dimensional Spreading for Doubly Dispersive Channels

- Performed information theoretic analysis of two dimensional spreading schemes such as VSF-OFCDM transmission for doubly-dispersive channels
- Derived optimal power allocation and coding strategies that maximized ergodic capacity for systems with and without the presence of CSI at the transmitter

Developing a Simulator for Turbo Encoder/Decoder

- Simulated a Turbo Codec in C with various convolutional codes, interleaver types, 8 iteration Log-MAP/Max-Log-MAP BCJR Decoding Algorithm
- Studied performances in AWGN and perfectly interleaved Rayleigh Channel

Teaching Assistant at Dept of ECE, Rutgers University

- Took recitation classes and graded performance in the undergraduate courses 'Probability and Stochastic Processes' and 'Control Systems Design'

Research Assistant at GSS School of Telecomm, IIT Kharagpur

- Development of Simulation Testbed to compare certain open and closed loop power control algorithms for cellular CDMA, in terms of number of users supported, call dropping etc
- Design and ASIC implementation of a digital baseband communications processor. The processor took data at 2.048Mbps, did framing, DQPSK modulation, RRC filtering, Joint ML Carrier Phase and Symbol Timing recovery

Intern at Interim Test Range, Defense Research & Development, (ITR), DRDO, Govt of India

Studied Electro – Optic location tracking methods of a missile after its launch.

Intern at Center for Advanced Technology, Govt of India

Design and PCB implementation of a circuit to measure displacement of a metallic cylinder relative to a wire in its axis. Involved concepts of capacitive coupling and FM

Research Interests

Dynamic Spectrum Management, Optimization and Economics based frameworks for Spectrum Allocation in wireless networks, Timing Acquisition in OFDM.

Publications

- 1) J. Acharya, S. Kundu, U. Jalan, S. Chakrabarti, " A Simulation Testbed for Performance Evaluation of Open Loop Power Control Algorithms for Cellular CDMA", In Proc. of National Conference of Communications,

- IIT Bombay, Jan 26-27, 2002
- 2) J. Acharya, R. Roy, J. Singh, C. Rose, "Optimal Signature Sets for Transmission of Correlated Data over a Multiple Access Channel", Proc. of IEEE GLOBECOMM 2004
 - 3) J. Acharya, R. D. Yates and L. Razoumov, "Two Dimensional Spreading for Dispersive Channels", Proc. of IEEE MILCOM, Oct 17-20, 2005
 - 4) J. Acharya, H. Liu, N. Mandayam, I. Seskar, R. D. Yates, G. Rajappan, R. Ulman, "Mobile Infostation Network Technology", Proc. SPIE Defense and Security Symposium, April 2006
 - 5) J. Acharya, R. D. Yates, "A Framework for Dynamic Spectrum Sharing between Cognitive Radios", In Proc. of IEEE ICC, Glasgow, 24-28 June 2007
 - 6) J. Acharya, R. D. Yates, "Profit Maximizing Pricing Strategies for Dynamic Spectrum Allocation", In Proc. of IEEE CISS, 14-16 March 2007
 - 7) J. Acharya, R. D. Yates, "A Price based Dynamic Spectrum Allocation Scheme", In Proc. of IEEE Asilomar, Monterey, California, 4-7 November 2007
 - 8) J. Acharya, R.D. Yates, "Resource and Power Costs in Dynamic Spectrum Allocation", In Proc. of IEEE CISS, Princeton University, New Jersey, 19 -21 March, 2008
 - 9) J. Acharya, H. Viswanathan, S. Venkatesan, "Timing Acquisition for enabling Dynamic Spectrum Access", accepted for publication, IEEE DYSPAN Chicago Oct. 14 – 17, 2008
 - 10) J. Acharya, R. D. Yates, "Dynamic Spectrum Allocation for Uplink Users with Heterogeneous Utilities", submitted to IEEE Transactions of Wireless Communications, 2008
 - 11) J. Acharya, R. D. Yates, " Downlink Allocation and Pricing of Spectrum for Operator Profit Maximization", manuscript under preparation

Relevant Courses

Stochastic Signals and Systems
 Digital Signals and Systems
 Information Theory and Coding
 Digital Communications
 Wireless Systems Instructional Design

Communication Networks I and II
 Communication Theory
 Detection and Estimation Theory
 Spectrum Management
 Linear Algebra

Achievements and Awards

- Merit positions in State level Mathematics Olympiads in high school (1995, 1997)
- Awarded National Talent Search Scholarship in 1995 by Govt. of India
- Obtained IEEE Student Travel grant for attending ICC 2007 held in Glasgow, Scotland.
- Served as Events Coordinator of the Central New Jersey chapter of the voluntary organization Asha for Education from May' 04- May' 05 and Chapter Coordinator of the same from May' 05 to Aug 06 and Projects Coordinator from Aug 07 – present.
- Ran the Philadelphia Marathon in Nov' 04 and fundraised for education of underprivileged children in India