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Current Appointments

NORTHWESTERN UNIVERSITY Evanston, IL
Jan. 2019 – present. Chair of Electrical and Computer Engineering
Jan. 2019 – present. John A. Dever Professor
Sept. 2011 – present. Professor of Electrical and Computer Engineering.
Sept. 2015 – present. Director Master of Science in Information Technology Program.

ROBERSON AND ASSOCIATES Schaumburg, IL
May 2018 – present. Principal Engineer

Education MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, MA
Ph.D. in Electrical Engineering and Computer Science, June, 2000.
Ph.D. Thesis: “Power and Delay Trade-offs in Fading Channels”.
Advisor: Prof. Robert Gallager.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, MA
S.M. in Electrical Engineering and Computer Science, June, 1996.
S.M. Thesis: “A Linear Control Approach to ATM Congestion Control”.
Advisor: Dr. Charles Rohrs.

UNIVERSITY OF MISSOURI - ROLLA Rolla, MO
B.S. in Electrical Engineering, December 1993.

Current Research

Interests

- Wireless Communications and Networking.
- Network Economics.
- Information Theory.

Experience

NORTHWESTERN UNIVERSITY Evanston, IL
Sept. 2017 – Dec. 2018. Lorraine H. Morton Professor
Sept. 2013 – Aug. 2015 Co-Director Master of Science in Information Technology Program
Sept. 2006 – Aug. 2011 Associate Professor of Electrical Engineering and Computer Science.
Sept. 2005 – Aug. 2006. Assistant Professor of Electrical Engineering and Computer Science.
Sept. 2000 – Aug. 2005. Assistant Professor of Electrical and Computer Engineering.

UNIVERSITY OF CALIFORNIA -BERKELEY Berkeley, CA
March 2007–May 2007 Visitor in the Wireless Foundations Center.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, MA
6/00 –8/00. Post-doctoral Research Associate, Laboratory for Information and Decision Systems.

1/96 – 6/00. Research Assistant. Supported by the Advanced Telecommunication/ Information Distribution Research Program (ATIRP) Consortium sponsored by the U.S. Army Research Lab. Research on architectural issues in mobile wireless networks.

MIT LINCOLN LABORATORY Lexington, MA
6/98 – 8/98. Research Staff, Advanced Networks Group. Research on optical access networks under the Next Generation Internet (NGI) project. Studied traffic grooming for SONET-WDM Networks.

**Teaching
Experience**

- *GEN_ENG 205-1: Engineering Analysis 1* F05, F06, F16, F17
Introduction to linear algebra and computational methods using Matlab.
- *GEN_ENG 206-1: Honors Engineering Analysis 1* F07, F08, F09, F10, F11, F12, F13, F14, F15, F16, F17
Introduction to linear algebra and computational methods using Matlab; honors track for advanced students.
- *EECS 222: Fundamentals of Signals and Systems* F03, F04
Linear system theory, Fourier series, continuous and discrete time Fourier transforms, Laplace transforms.
- *EECS 307: Communication Systems* F18
Analysis of analog and digital communication systems, modulation, filtering, noise.
- *EECS 333: Introduction to Communication Networks* F00, F01, F02
Layered architectures, error recovery and retransmission protocols, medium access control, routing, switching, congestion control, examples of network protocols including TCP/IP, Ethernet, IEEE 802.11.
- *EECS 422: Random Processes in Communications and Control I* W10, W11, W12, W13, W14, W15, W16, W17, W18, W19
Convergence of random variables, Limit theorems, Random processes, Gaussian and Poisson Processes, mean-square estimation, Markov Chains, Random processes and linear systems.
- *EECS 454: Advanced Communication Networks* W01, W02, W03, W04, W05, S06, S08, S10, S13
Distributed algorithms, basic queueing theory, shortest path routing, optimal routing, window-based and rate-based flow control, TCP modeling, network calculus, network economics and pricing.
- *EECS 428: Information Theory* S02, S04
Information measures, lossless source coding, universal source coding, the channel coding theorem, band-limited Gaussian noise channels, error exponents, rate-distortion theory.
- *EECS 495: Game Theory and Networked Systems* (new course/co-taught with Prof. E. Wei) S17
Non-cooperative games, Nash equilibrium and other solution concepts, dynamic games, games of incomplete information, applications to networked systems.
- *EECS 510: Advanced Wireless Networks* (new course) S03, S05
Wireless channel models, single-user and multi-user capacity regions, diversity gains, MIMO channels, adaptive modulation and coding, energy efficiency, resource allocation, multiuser diversity.
- *EECS 510: Probabilistic Techniques in Communication and Computation* (new course) S09
Discrete Stochastic processes and randomized algorithms, tail inequalities, random walks, martingales, Markov chains.
- *MSIT 491: Selected Topics in Information Technology: Emerging Technologies* W06, W07
Three week segment on sensor networks; part of professional Masters program in information technology.

- *MSIT 432 Communication Networks* S08, S09, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19
Basic principles of communication networks and their application in the Internet; part of professional Masters program in information technology.
- *Independent Study Projects*
 - EECS 499* summer 18 - Sylvia Fu - Motomods project.
 - EECS 499* Y. Cao - "Analysis of Amazon Review Data"
 - INF-TECH 499* Winter 17 - A. Gupta, L. Chiu, J. Wang, X. Zhou - "Google Ad-words Competition"
 - EECS 399* Spring 11 - Matt Dzugan - "Simulating Effects of Both Integer and Fractional Reuse on Achieved Rates in Modern Cellular Networks"
 - DSGN 298/398* Winter/Spring '10 - Faculty advisor for Segal Design Team project: "Cetacean Fetal Monitor."
 - EECS 399* Winter 09 - Melvin Ong - "Simulation Study for Power Pricing Performance in Mobile Wireless Networks."
 - ECE 399* Winter/Spring 05 - John Valez, "OPNET Simulation of Vehicular Communication Networks," supported by *GM undergraduate research grant*.
 - ECE 499* Summer 03 - Yunhai Yang, "Overview of Network Security"
 - ECE 399* Winter 02 - Eren Soyak, "Overview of 2G and 3G Wireless Networks"
 - ECE 399* Spring 01 - Chrisilia Davis - "Bluetooth Wireless Networks"
 - ECE 499* Fall 00 - Madhvi Verma - "QoS approaches in IP"
- *Undergraduate and high school research projects*
 - 2018-19 Academic year: Bharath Sreenivas and Moksh Shah, High school students from Illinois Mathematics and Science Academy.
 - 2017-18 Academic year: Joshua Eberhardt, Bharath Sreenivas, High school students from Illinois Mathematics and Science Academy.
 - Summer 2017 - Matthew Baughman - summer undergraduate research project.
 - Summer 2016 - Sylvia Fu - summer undergraduate research project.
 - 2015-16 Academic year: Rohit Mittapalli and Alcaeus Lam - "Bandwidth and Price Optimization in Heterogeneous Cellular Networks," High school students from Illinois Mathematics and Science Academy.
 - Summer 2015 - Rohit Mittapalli - "The Impact of Experts and Error in Observation on Informational Cascades," High school student from Illinois Mathematics and Science Academy.
 - 2012-14 - Mack Lee - "Reusing Bandwidth to Maximize Speed and Coverage for the Growing Demand of Cellular Customers" - High school student from Illinois Mathematics and Science Academy.

Professional Activities

- Editorships:
 - *IEEE Open Journal of the Communications Society*, Area Editor for "Network Science and Economics," 2019-present.
 - *Journal of Communications and Networks*, Division Editor for "Networks and Services," 2017-present.
 - *IEEE Journal on Selected Areas in Communications*, Guest editor for two special issues on "Game Theory for Networks," 2017.
 - *IEEE Transactions on Information Theory*, Associate Editor for Communication Networks, 2008-2012.
 - *IEEE Transactions on Wireless Communications*, Editor, 2006 - 2009.
 - *IEEE Journal of Selected Topics in Signal Processing*, Guest Editor for special issue on "Signal Processing and Networking for Dynamic Spectrum Access," Feb. 2008.

- *IEEE Transactions on Information Theory*, Guest Editor for special issue on “Models, Theory and Codes for Relaying and Cooperation in Communication Networks,” Oct. 2007.
- Conference Organizing Committees
 - Steering Committee Member, IEEE DySPAN, 2017-present.
 - Plenary and Panels Chair, *IEEE VTC-Fall* 2018.
 - Technical Program Committee Chair, *ACM MOBIHOC* 2018.
 - Keynote and Panels Chair, *IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, 2017.
 - Co-organizer, *IEEE ITSOC Shannon Centennial Event*, Chicago IL, Sept. 2016.
 - Workshop co-organizer, *2016 Workshop on Resource Allocation, Cooperation and Competition in Wireless Networks (RAWNET)*, 2016.
 - Technical Area Chair (Networks), *Asilomar conference on Signals, Systems, and Computers* 2015.
 - Workshop Chair, *ACM MOBIHOC*, 2015.
 - Registration chair, *ACM SIGCOMM* 2014.
 - Panel Chair, *2014 CrownCom*.
 - Panel Co-chair, *2013 CrownCom*.
 - Co-chair, *2012 IEEE Communication Theory Workshop*.
 - Publications co-chair, *IEEE INFOCOM 2012*.
 - Co-organizer, NSF sponsored workshop on *Spectrum Markets: Challenges Ahead*, 2011.
 - Workshop co-organizer, *7th Workshop on Resource Allocation in Wireless Networks (RAWNET)*, 2011.
 - Technical Program co-chair, *2010 IEEE ICC Wireless Networking Symposium*.
 - Program and Local Arrangements co-chair, *2nd Annual North American School of Information Theory*, 2009.
 - Technical Program co-chair, *2008 IEEE Communication Theory Workshop*.
 - Panels co-chair, *2008 ACM Mobihoc*.
 - TPC Meeting Chair, *2007 IEEE INFOCOM*.
 - Minisymposium Co-chair, *2007 IEEE INFOCOM*.
 - Organizer, Recent Results Poster Session, *2004 IEEE International Symposium on Information Theory*, June 2004.
 - Co-chair, Local Arrangements Committee, *2004 IEEE International Symposium on Information Theory*, June 2004.
- Technical Program Committees:
 - *IEEE ICC Cognitive Radio and Networks Symposium* 2013-16, 2018-20.
 - *International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks (WiOpt)* 2006, 2007, 2009, 2010, 2015-16, 2018-20
 - *ACM MOBIHOC* 2007, 2009, 2011-13, 2015-17, 2019-20.
 - *Workshop on Resource Allocation in Wireless Networks (RAWNET)* 2006, 2007, 2009, 2010, 2012, 2014, 2017, 2019-20.
 - *IEEE First IEEE Workshop on the ECOnomics of Fog, Edge, and Cloud Computing (ECOFEC 2019)*.
 - *IEEE GLOBECOM Green Communication Systems and Networks Symposium* 2019.
 - *IEEE GLOBECOM Cognitive Radio and AI-enabled Networks Symposium* 2019.
 - *IEEE Symposium on New Frontiers in Dynamic Spectrum Access Networks (DySPAN)* 2010, 2011, 2012, 2014, 2018, 2019.
 - *IEEE International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS)* 2017, 2018.
 - *IEEE GLOBECOM Cognitive Radio and Networks Symposium* 2011, 2016, 2017, 2018.

- *IEEE INFOCOM* 2005-08, 2013-16 (Area chair in 2015-17).
- *International Workshop on Internet Charging and QoS Technologies (ICQT)* 2017.
- *Conference on Wireless On-demand Network Systems and Services (WONS)* 2017, 2018, 2019.
- *2017 IEEE Information Theory Workshop*
- *IEEE Workshop on Network Science for Communication Networks (NetSciCom)* 2017.
- *ACM Sigmetrics* 2015, 2016.
- *IEEE Workshop on Smart Data Pricing* 2013-17.
- *IEEE International Symposium on Information Theory* 2013-15.
- *ACM workshop on Cognitive Radio Architectures for Broadband (CRAB)* 2013-14.
- *IEEE GLOBECOM Communication Theory Symposium* 2014.
- *International Symposium on Information Theory and its Applications (ISITA)* 2014.
- *IEEE GLOBECOM Symposium on Selected Areas in Communications, Game theory for Communications Track* 2013.
- *Workshop on the Economics of Networks, Systems, and Computation (NetEcon)* 2011.
- *International Conference on Game Theory for Networks (GAMENETS)* 2011.
- *International Workshop on Wireless Networks: Communication, Cooperation and Competition (WCN3)* 2010.
- *2010 IEEE GLOBECOM Wireless Communications Symposium*
- *2009 IEEE Information Theory Workshop on Networking and Information Theory (ITW 2009)*
- *2009 IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON 2009)*
- *IEEE International Conference on Communications (ICC) - Communication Theory Workshop* 2009.
- *2nd International Workshop on Game Theory in Communication Networks (GameComm)* 2008.
- *2nd Workshop on Network Control and Optimization (NET-COOP)* 2008, 2014
- *IEEE International Workshop on Cognitive Radio Networks*, 2007, 2008.
- *First International Workshop on Cognitive Wireless Networks (CWNets)* 2007.
- *International Conference on Cognitive Radio Oriented Wireless Networks and Communications (CrownCom)* 2007.
- *IEEE Broadnets Wireless Symposium* 2007.
- *IEEE Wireless Communications and Networking Conference (WCNC) 2006 - PHY/MAC track*.
- *IEEE Vehicular Technology Conference Fall 2005*.
- *Symposium on Information Theory, WirelessCOM 2005*.
- *3rd International Symposium on Information Processing in Sensor Networks*, April 2004.
- *1st Symposium on Photonics, Networking and Computing*, March 2002.
- Session organizing:
 - Organizer, invited panel on “Spectrum Policy,” *IEEE Communication Theory Workshop*, June 2017.
 - Co-organizer, invited session on “Heterogeneous Wireless Networks,” *IEEE Communication Theory Workshop*, May 2015.
 - Co-organizer, invited session on “Wireless Resource Allocation,” *48th IEEE Conference on Decision and Control (CDC)*, Dec. 2009.
 - Co-organizer and session chair, two invited sessions on “Game theory and Dynamic Spectrum Sharing,” *2009 International Conference on Game Theory for Networks (GameNets 2009)*, May, 2009.

- Co-organizer, invited session on “Network Coding for Wireless Networks” *The 4th International Wireless Internet Conference (WICON 2008)*, Nov. 2008.
- Co-organizer, invited session on “Resource Allocation and Scheduling in Wireless Networks,” *46th IEEE Conference on Decision and Control (CDC)*, Dec. 2007.
- Organizer, invited session on “Cross-layer Optimization in Wireless Resource Allocation,” *Asilomar conference on signals, systems and computers*, Nov., 2007.
- Invited Participant, Wireless Spectrum R&D (WSRD) Senior Steering Group Workshop on “Artificial Intelligence & Wireless Spectrum: Opportunities and Challenges, August 2019.
- Invited Participant, Wireless Spectrum R&D (WSRD) Senior Steering Group Workshop on “Security from a Wireless Spectrum Perspective: Technology Innovation and Policy Research Needs,” Sept. 2018.
- Invited Participant, National Science Foundation workshops on “Future Directions in Edge Networking,” March 2018.
- Invited Participant, National Science Foundation workshops on “Low Latency Wireless Networks,” March 2015 and November 2016.
- Invited Participant, National Science Foundation workshop on “Spectrum Measurements Infrastructure,” April 2016.
- Invited Participant, Wireless Spectrum R&D (WSRD) Senior Steering Group Workshop on “Federal - Commercial Spectrum Sharing: Models, Application, and Impacts of Incentives for Sharing,” March 2015.
- Invited Participant, National Science Foundation EARS National Wireless Research Collaboration Workshop, March 2015.
- Invited Participant, NSF SaTC PI meeting, Jan. 2015.
- Invited Participant, National Science Foundation EARS PI workshop, Sept. 2013.
- Invited Participant, Wireless Spectrum R&D (WSRD) Senior Steering Group Workshop, on “Promoting Economic Efficiency in Spectrum Use: the economic and policy R&D Agenda,” April 2013.
- Invited participant, National Science Foundation Workshop on “Beyond Cognitive Radios,” June 2011.
- Invited panelist for panel on “Interference” at the *2011 IEEE Communication Theory Workshop*, June 2011.
- Invited participant, US-Finland workshop on “Wireless Networks”, May 2011.
- Invited participant, National Science Foundation Workshop on “Future Wireless Communication Networks,” Nov. 2009.
- Invited panelist for panel on “Future Research Directions in Wireless Networks,” *Illinois Wireless Summer School*, University of Illinois at Urbana-Champaign, Aug. 3-7, 2009.
- Invited participant and panelist, “USC Invited Workshop on Theory and Practice in Wireless Networks,” University of Southern California, May 19-20, 2008.
- Invited participant and break-out session chair, National Science Foundation workshop on “Bridging the Gap between Wireless Networking Technologies and Advances at the Physical Layer”, August, 2007.
- Invited Participant, National Science Foundation Workshop on “Mobile Wireless Technology and the Impacts on Future Internet,” Helsinki, Finland, and Stockholm, Sweden, May, 2007.
- Panelist on National Science Foundation peer review panels, 2002, 2003, 2004, 2009, 2011, 2012, 2014, 2016, 2019.
- Reviewed proposals for many agencies including U.S. Army Research Lab, Department of Defense, Defense Threat Reduction Agency, Qatar National research fund, Research Grants Council of Hong Kong, Natural Sciences and Engineering Research Council of Canada, The Israel Science Foundation.

- Reviewer for numerous journals and conferences.
- Member of IEEE (Institute of Electrical and Electronics Engineers), IEEE Communication Society, IEEE Information Theory Society, ACM.

Honors and Awards

- IEEE Workshop on Smart Data Pricing, Bell Labs Best Paper Award (with Yinning Zhu), 2017.
- Keynote Speaker, 2017 IEEE Workshop on Smart Data Pricing, May 2017.
- International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt), Best Paper Award (with Chang Liu) 2016.
- IEEE Workshop on Smart Data Pricing, Bell Labs Best Paper Award (with Chang Liu) 2015.
- Elevated to fellow of the IEEE, class of 2014.
- Appointed distinguished lecturer of the IEEE Communication Society 2014-16.
- Northwestern University Associated Student Government (ASG) Faculty and Administrator Honor Roll, 2011-12, 2015-16.
- DARPA Young Investigator Team Award for ITMANET Program (2006).
- Keynote speaker, *2nd Workshop on Resource Allocation in Wireless Networks (RAWNET 2006)*, Boston MA, March 2006.
- National Science Foundation (NSF) CAREER award, 2003.
- Northwestern University Department of Electrical and Computer Engineering “Best Teacher” award, 2001-2002 academic year.
- Invited plenary speaker, *2002 LIDS Student Conference*, Laboratory for Information and Decision Systems, MIT.
- Elected Full Member of *Sigma Xi*, 2000 (MIT chapter).
- University of Missouri-Rolla - Motorola Scholarship in Electrical Engineering 1992–93, Schlumberger Foundation Scholarship, 1991–1992 (awarded to top student in the EE department).
- National Merit Scholarship, 1989–1993.

Funding

- [F1] “CNS Core: Small: Collaborative Research: The Interplay of Markets and Security in 5G Shared Spectrum Services,” (with D. Starobinski, BU) *National Science Foundation*, 10/1/2019-9/30/2022.
- [F2] “Performance Objective Framework Characterization and Safety Feature Improvement in V2X Networks During Congestion,” *Ford Motor Company*, 1/1/18-12/31/19.
- [F3] “Analytical Validation of 3GPP R14 C-V2X and Comparison with DSRC at High Loads,” *Ford Motor Company*, 9/1/17-12/31/17.
- [F4] “WiFiUS: Collaborative Research: Ultra-low latency and High Reliability for Wireless IoT,” (with E. Modiano, MIT) *National Science Foundation*, 4/1/17- 3/31/19.
- [F5] “Collaborative Research: Enhancing Access to Radio Spectrum for Real-time Monitoring and Control,” (with E. Modiano, MIT), *National Science Foundation*, 9/1/15-8/31/18.
- [F6] “CTIA Phase 1,” (with M. Werwath), *CTIA - the Wireless Association*, 10/22/14-9/12/15.
- [F7] “TWC SBE: Medium: Collaborative: Incentive Compatible Wireless Security,” PI (with A. Yener, Penn State and S. Ulukas, Univ. of Maryland), *National Science Foundation*, 10/1/13-9/30/18.
- [F8] “Spectrum Sharing in the Shadow of Uncertainty: Risk, Incentives and Investment,” PI (with M. Honig, V.Subramanian, and R. Vohra), *National Science Foundation*, 9/1/13 - 8/31/18.
- [F9] “Market Structures for Efficient Spectrum Sharing,” PI (with M. Honig, V.Subramanian, and R. Vohra), *National Science Foundation*, 9/15/12 - 8/31/13.

- [F10] “III:Small:Inferring First Movers in Large-Scale Network Games” co-PI (with V.Subramanian), *National Science Foundation*, 9/1/12-8/31/15.
- [F11] “Collaborative Research: Robust and Secure Cognitive Radio Networks” PI (With S. Ulukus, Univ. of Maryland), *National Science Foundation*, 9/1/11-8/31/13.
- [F12] “Dynamic Spectrum Market Workshop” PI (with M. Honig), *National Science Foundation*.
- [F13] “Proposal for Supporting Students Attending the Second Annual North American School of Information Theory,” PI (with D. Guo), *National Science Foundation*, 8/1/09-4/30/10.
- [F14] “Support for 2nd Annual School of Information Theory,” PI (with D. Guo), *Army Research Office*, 8/7/09-2/6/10.
- [F15] “NeTS: Medium: Design of Dynamic Spectrum Markets for Wireless Networks” PI (with M. Honig (EECS, Northwestern) and R. Vohra (Kellogg School of Management, Northwestern), *National Science Foundation*, 8/1/09-7/31/13.
- [F16] “CIF: Medium: Collaborative Research: Cooperative Networking Across the Layers,” PI (with S. Vishwanath, University of Texas at Austin, and A. Ephremides, University of Maryland), *National Science Foundation*, 8/1/09-7/31/12.
- [F17] “Rethinking Mobile Ad Hoc Networks: A Non-equilibrium Information Theory,” co-PI (with D. Guo and 11 other co-PI’s from 7 universities), *DARPA*, 9/1/06-2/28/11.
- [F18] “Collaborative Research: NeTS-NBD: Optimal Channel-Aware Access Control for Multi-hop Wireless Networks,” PI (with S. Vishwanath, University of Texas at Austin, and A. Ephremides, University of Maryland), *National Science Foundation*, 9/15/06-8/31/08.
- [F19] “Dynamic Spectrum Sharing with Limited Network State Information,” co-PI (with M. Honig), *Army Research Office*, 8/1/06-7/30/09.
- [F20] “NeTS-ProWiN: Smart Markets for Smart Radios,” PI (with M. Honig (ECE, Northwestern) and R. Vohra (Kellogg School of Management, Northwestern), *National Science Foundation*, 9/1/05-8/31/09.
- [F21] “CAREER: Cross Layer Resource Allocation in Wireless Networks,” PI, *National Science Foundation*, 9/1/03–8/31/08.
- [F22] “Scheduling and Resource Allocation for MIMO-OFDM,” PI (with M. Honig) *Northwestern-Motorola Center for Telecommunications*, 9/1/06–8/31/08.
- [F23] “Video Transmission Over HSDPA,” Co-PI (with T. Pappas and A. Katsaggelos), *Northwestern-Motorola Center for Telecommunications*, 9/1/03–8/31/07.
- [F24] “Collaborative Research: ITR: Fundamental Performance Trade-offs for Ad-hoc Networks,” PI, (with E. Yeh, Yale University), *National Science Foundation*, 7/1/03–6/30/06.
- [F25] “A Framework for Efficient Wireless Video Communication: Dynamic Source Channel Adaptation and Distortion Evaluation,” Co-PI (with T. Pappas and A. Katsaggelos), *National Science Foundation*, 9/1/03–8/31/06.
- [F26] “Design and Performance of Cooperative Ad Hoc Wireless Networks,” PI (with M. Honig), *Northwestern-Motorola Center for Telecommunications*, 9/1/03–8/31/06.
- [F27] “TCP/IP Wireless Access Networks - Performance Modeling and Traffic Control,” PI (with C.C. Lee and A. H. Haddad), *Northwestern-Motorola Center for Telecommunications*, 9/1/03–8/31/06.
- [F28] “NSF/USDOT Development and Testing of a Vehicle Based Zero-Public Infrastructure Real-Time Traffic Information System,” Co-PI (with A. Ziliaskopoulos, Dept. of Civil Engineering, Northwestern University), *National Science Foundation*, 10/1/02–9/31/05.
- [F29] “Utility-Based Scheduling for Wireless Networks,” Co-PI (with M. Honig, Northwestern University), *Northwestern-Motorola Center for Telecommunications*, 9/1/01–8/31/03.
- [F30] “Downstream Traffic Control for TCP/IP Networks,” Co-PI (with C. C. Lee and A. H. Haddad, Northwestern University), *Northwestern-Motorola Center for Telecommunications*, 9/1/01–8/31/03.

- [F31] “Image and Video Processing and Communication in the SenseIT Program,” Co-PI (with T. Pappas and A. Katsaggelos, Northwestern University), *Defense Advanced Research Projects Agency (DARPA) SenseIT Program*, 3/1/01–6/14/03.

Publications

Books or Book Chapters

- [B1] R. Berry, “Preferences and Utility Functions,” in *Encyclopedia of Wireless Networks* Shen X., Lin X., Zhang K. (eds), Springer, 2018.
- [B2] R. Berry, M. Honig, and R. Vohra, “Spectrum markets: motivation, challenges, and implications,” in *Handbook of Spectrum Auction Design*, M. Bichler and J. Goeree, ed., Cambridge University Press, 2017.
- [B3] R. Berry and R. Johari, “Economic Modeling with Engineering Applications,” *Foundations and Trends in Networking*, NOW publishers, 2013.
- [B4] R. Berry, E. Modiano, and M. Zafer, *Energy-Efficient Scheduling under Delay Constraints for Wireless Networks*, Morgan & Claypool, 2012.
- [B5] J. Huang, V. Subramanian, R. Berry and R. Agrawal, “Scheduling and Resource Allocation in OFDMA Wireless Communication Systems,” in *Orthogonal Frequency Division Multiple Access Fundamentals and Applications*, T. Jiang, L. Song and Y. Zhang, ed., Auerbach Publications, Taylor and Francis Group, April, 2010.
- [B6] R. Berry, “Information Theory,” in *Wiley Encyclopedia of Telecommunications*, J. Proakis, ed., John Wiley and Sons, New York, Dec. 2002.

Journal (In Review)

- [S1] H. Yu, E. Wei and R. Berry, “Monetizing Mobile Data via Data Rewards,” *under submission*.
- [S2] G. Allon, G. Askalidis, R. Berry, N. Immorlica, K. Moon, and A. Singh, “When to Be Agile: Ratings and Version Updates in the Mobile App Market,” *under submission*.
- [S3] C. Chen, R. Berry, M. Honig, and V. Subramanian, “Pricing, Bandwidth Allocation and Service Competition in Heterogeneous Wireless Networks.” *under submission*.

Journal (In Print or In Press)

- [J1] B. Badia, R. Berry, and E. Wei, “Investment in EV Charging Spots for Parking,” to appear *IEEE Transactions on Network Science and Engineering* (accepted 2019).
- [J2] R. Berry, M. Honig, T. Nguyen, V. Subramanian and R. Vohra, “The Value of Sharing Intermittent Spectrum,” to appear *Management Science* (accepted 2019).
- [J3] H. Yu, E. Wei, and R. Berry, “Analyzing Location-Based Advertising for Vehicle Service Providers Using Effective Resistances,” *Proceedings of the ACM on Measurement and Analysis of Computing Systems*, vol. 3, no. 1, March 2019.
- [J4] A Ghosh, R Berry, V Aggarwal, “Spectrum Measurement Markets for Tiered Spectrum Access,” *IEEE Transactions on Cognitive Communications and Networking*, vol. 4, no. 4, pp. 929-941, September 2018.
- [J5] J. Kaleva, A. Tlli, M. Juntti, R. A. Berry and M. L. Honig, “Decentralized Joint Precoding With Pilot-Aided Beamformer Estimation,” *IEEE Transactions on Signal Processing*, vol. 66, no. 9, pp. 2330-2341, May 2018.

- [J6] C. Chen, R. Berry, M. Honig, and V. Subramanian, "Competitive Resource Allocation in HetNets: the Impact of Small-cell Spectrum Constraints and Investment Costs," *IEEE Transactions on Cognitive Communications and Networking*, vol. 3, no. 3, pp. 478-490, September 2017 (Selected for Fast-Track Submission from Papers presented at IEEE DySPAN 2017).
- [J7] T. Le, R. Berry, and V. Subramanian, "Information Cascades with Noise," *IEEE Transactions on Signal and Information Processing over Networks*, Vol. 3, no. 2, pp. 239-251, June 2017.
- [J8] A. Ghosh, S. Sarkar, and R. Berry, "The Value of Side-information in Secondary Spectrum Markets," *IEEE Journal on Selected Areas in Communications*, special issue on "Spectrum Sharing and Aggregation for Future Wireless Networks," Vol. 35, no. 1, pp. 6-19, January 2017.
- [J9] T. Nguyen, H. Zhou, R. Berry, M. Honig, and R. Vohra, "The Cost of Free Spectrum," *Operations Research*, vol. 64, no. 6, pp. 1217-1229, November-December 2016.
- [J10] T. Nguyen, V. Subramanian and R. Berry, "Searching and Bargaining with Middlemen," *Operations Research*, special issue on "Information and Decisions in Social and Economic Networks," vol. 64, no. 3, pp. 646-661, May-June 2016.
- [J11] B. Singh, S. Hailu, K. Koufos, A. Dowhuszko, O. Tirkkonen, R. Jntti, and R. Berry, "Coordination protocol for inter-operator spectrum sharing in co-primary 5G small cell networks," *IEEE Communications Magazine*, vol. 53, no. 7, pp. 34-40, July 2015.
- [J12] C. Shi, R. Berry, and M. Honig, "Bi-directional training for adaptive beamforming and power control in interference networks", *IEEE Transactions on Signal Processing*, vol. 62, no. 3, Feb. 2014.
- [J13] Y. E. Sagduyu, D. Guo and R. A. Berry, "Throughput and stability for relay-assisted wireless broadcast with network coding," *IEEE Journal on Selected Areas in Communications*, vol. 31, no. 8, pp. 1506-1516, August 2013.
- [J14] D. Schmidt, C. Shi, R. Berry, M. Honig, and W. Utschick, "Comparison of Distributed Beamforming Algorithms for MIMO Interference Networks," *IEEE Journal on Signal Processing*, vol. 61, no. 13, pp. 3476-3489, July 2013.
- [J15] H. Zhou, R. Berry, M. Honig, and R. Vohra, "Complexity of Allocation Problems in Spectrum Markets with Interference Complementarities," *IEEE Journal on Selected Areas of Communications*, Cognitive Radio series, vol. 31, no. 3, pp. 489-499, March 2013.
- [J16] R. Berry, "Optimal Power/Delay Trade-offs in Fading Channels - Small Delay Asymptotics," *IEEE Transactions on Information Theory*, vol. 59, no. 6, pp. 3939 - 3952, March 2013.
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- [C143] Y. Eisenberg, C. Luna, T. Pappas, R. Berry and A. Katsaggelos, "Optimal Source Coding and Transmission Power Management Using a Min-Max Expected Distortion Approach," *Proceedings of 2002 IEEE International Conference on Image Processing*, Rochester, NY, Sept. 22–25, 2002.
- [C144] P. Marbach and R. Berry, "Downlink Resource Allocation and Pricing for Wireless Networks," *Proceedings of IEEE INFOCOM 2002*, New York, NY, June 23–27, 2002.
- [C145] C. Luna, Y. Eisenberg, R. Berry, T. Pappas, and A. Katsaggelos, "Joint Source Coding and Data Rate Adaption for Energy Efficient Wireless Video Streaming," *Proceedings of 12th International Packetvideo Workshop*, Pittsburgh, PA, April 24–26, 2002.
- [C146] C. Luna, Y. Eisenberg, T. Pappas, R. Berry, and A. Katsaggelos, "Joint Source Channel Coding for Efficient Energy Utilization in Wireless Video Communication," *Proceedings of 35th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 4–7, 2001.
- [C147] X. Qin and R. Berry, "Exploiting Multiuser Diversity in Wireless ALOHA Networks," *Proceedings of 2001 Allerton Conference on Communication, Control, and Computing*, Oct. 3–5, 2001.
- [C148] Y. Eisenberg, T. Pappas, R. Berry, and A. Katsaggelos, "Minimizing Transmission Energy in Wireless Video Communications," *Proceedings of 2001 IEEE International Conference on Image Processing*, Thessaloniki, Greece, Oct. 7–10, 2001.
- [C149] C.E. Luna, Y. Eisenberg, T. Pappas, R. Berry, and A. Katsaggelos, "Transmission Energy Minimization in Wireless Video Streaming Applications," *Proceedings of International Symposium on Telecommunications*, Tehran, Iran, Sept. 1–3, 2001.
- [C150] R. Berry, "Communications over Fading Channels with Finite Buffer Constraints - Single User and Multiple Access Cases," *Proceedings of 2001 IEEE International Symposium on Information Theory*, Washington, D.C., June, 2001.
- [C151] E. Modiano and R. Berry, "Using Grooming Cross-connects to Reduce ADM Costs in SONET/WDM Ring Networks", *Proceedings of OFC 2001*, Anaheim, CA, March 2001.
- [C152] R. Berry and R. Gallager, "Buffer Control for Communication over Fading Channels," *Proceedings of 2000 IEEE International Symposium on Information Theory*, Sorrento, Italy, June 2000.
- [C153] R. Berry and E. Modiano, "Minimizing Electronic Multiplexing Costs for Dynamic Traffic in Unidirectional SONET Ring Networks," *Proceedings of ICC 1999*, Vancouver, Canada, June 1999.
- [C154] R. Berry, S. Finn, R. Gallager, H. Kassab, and J. Mills, "Issues in Low Power Wireless Communication," *Proceedings of 3rd ARL Fed. Lab. Symposium*, College Park, MD, Feb. 2–4, 1999.
- [C155] R. Berry and E. Modiano, "Grooming Dynamic Traffic in Unidirectional SONET Ring Networks," *Proceedings of OFC 1999*, San Diego, CA, February, 1999.
- [C156] R. Berry, S. Finn, R. Gallager, H. Kassab, and J. Mills, "Multiple Access Techniques in Future Army Communications," *Proceedings of 2nd ARL Fed. Lab. Symposium*, College Park, MD, Feb. 5–6, 1998.
- [C157] C.E. Rohrs and R. Berry, "A Linear Control Approach to Explicit Rate Feedback in ATM Networks," *Proceedings of IEEE INFOCOM 1997*, pp. 277–82, Kobe, Japan, April 7–11, 1997.

- [C158] R. Berry, S. Finn, R. Gallager, H. Kassab, and J. Mills, “Architecture for Local Wireless Military Networks,” *Proceedings of 1st ARL Fed. Lab. Symposium*, College Park, MD, Jan. 21–22, 1997.
- [C159] C.E. Rohrs, R. Berry, and S.J. O’Halek, “Control Engineer’s look at ATM congestion avoidance,” *Proc. Globecom ’95*, pp. 1089–94, Singapore, Nov. 13–17, 1995.

Invited Talks at Conferences and Workshops

- [N1] “Spectrum Measurement Markets,” *2019 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2019.
- [N2] “Duopoly Competition in Advertising-Sponsored Wi-Fi Provision,” *Workshop on Information Technologies and Systems (WITS) special session on “Smart Data Pricing and Network Economics”*, San Jose, CA, December 2018.
- [N3] “Learning from Randomly Arriving Agents,” *INFORMS annual meeting 2018*, Phoenix, Az, Nov. 2018.
- [N4] “Pricing and Bundling Licensed and Unlicensed Service,” *Smart Data Pricing Forum*, Minneapolis, MN, May 2018.
- [N5] “Learning from Randomly Arriving Agents,” *Mobihoc TPC meeting workshop*, March 2018.
- [N6] “Dominant Strategy Allocation of Divisible Network Resources with Limited Information Exchange,” *2018 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2018.
- [N7] “The Impact of Intermittent Spectrum on Wireless Service Competition,” invited keynote presentation, *IEEE INFOCOM Workshop on Smart Data Pricing*, May 2017.
- [N8] “The Sharing Economics of Wireless Spectrum,” *6th Midwest Workshop on Control and Game Theory*, Ann Arbor, MI, April 2017.
- [N9] “Competition and Investment with Tiered Shared Spectrum,” *2017 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2017.
- [N10] “Investment and Competition with Shared Spectrum,” *INFORMS annual meeting 2016*, Nashville, TN, Nov. 2016.
- [N11] “Games and Information,” *IEEE ITSOC Shannon Centennial Event*, Sept. 2016.
- [N12] “Competition with Tiered Spectrum Sharing,” *2016 14th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*, Tempe, AZ, May 2016.
- [N13] “The questionable value of experts,” *2016 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2016.
- [N14] “Information Theoretic Games with Secrecy Constraints,” *2015 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2015.
- [N15] “Distributed Resource Allocation and Interference Alignment,” *ACM Mobihoc Workshop on Interference Alignment*, Philadelphia PA, Aug. 2014.
- [N16] “Observational Learning With Noise,” *ACM Mobihoc Workshop on Frontiers of Networks: Theory and Algorithms*, Philadelphia PA, Aug. 2014.
- [N17] “Markets for Intermittent Spectrum,” *2014 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2014.
- [N18] “Market Structures for Efficient Spectrum Sharing,” *NSF EARS PI Workshop*, Oct. 2013.
- [N19] “Bargaining in Networks with Middlemen,” *IMSE Summer School on Multi-agent Networked Systems*, University of Illinois at Urbana-Champaign, August 2013.
- [N20] “Interference Games: from Power Control to Information Theory,” *2013 IEEE Communication Theory Workshop*, Phuket, Thailand, June 2013.

- [N21] “The Price of Free Spectrum,” *Wireless Communications and Economics Workshop*, The Chinese University of Hong Kong, June 2013.
- [N22] “Investment and Wireless Capacity Sharing,” *2013 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2013.
- [N23] “Investment and Competition in Unlicensed Spectrum,” *INFORMS annual meeting 2012*, (invited talk) Phoenix, AZ, October, 2012.
- [N24] “The Combinatorial Structure of Linear Deterministic Interference Channels,” *Workshop on Interference in Networks (WINE)*, Boston University, June 30, 2012.
- [N25] “Spotting trendsetters: inference for network games,” *2012 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2012.
- [N26] “The impact of unlicensed spectrum on wireless services competition,” *2011 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2011.
- [N27] “On Complementaries in Spectrum Markets,” *2010 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2010.
- [N28] “Real-time Wireless Spectrum Markets,” *INFORMS Annual Meeting*, San Diego, CA, Oct. 2009.
- [N29] “Distributed Interference Pricing Pricing for Wireless Networks,” *Optimization Applications in Engineering and Applied Sciences (OptimA) Conference*, Champaign, IL, March 2009.
- [N30] “On Distributed Interference Pricing,” *2009 Information Theory and Applications Workshop*, San Diego, CA, Feb. 2009.
- [N31] “Distributed Interference Pricing for Multi-antenna Ad hoc Networks,” *First IEEE Workshop on the Theory of Ad-Hoc and Sensor Networks (ThASN 08)*, Atlanta, GA, Sept. 2008.
- [N32] “Distributed Interference Pricing for Spectrum Sharing,” *2008 IEEE Communication Theory Workshop*, St. Croix, U.S. Virgin Islands, May 2008.
- [N33] “Game Theoretic Approaches for Wireless Spectrum Sharing,” Minisymposium on “Optimization and Game Theoretic Analysis of Multiuser Communication Systems,” *SIAM Conference on Optimization*, Boston, MA, May 2008.
- [N34] “Energy and Delay Trade-offs in Wireless Networks,” *2008 International Zurich Seminar on Communications*, Zurich, Switzerland, March 2008.
- [N35] “Efficiency Bounds for Sequential Wireless Resource Allocation Auctions,” *2008 Information Theory and Applications Workshop*, San Diego, CA, Jan. 2008.
- [N36] “Auction-based Spectrum Sharing,” *Workshop on Mathematical Modeling and Analysis of Computer Networks*, ENS, Paris, France, June, 2007.
- [N37] “Gradient-based Scheduling and Resource Allocation in OFDMA systems,” *IEEE Communication Theory Workshop*, May 2006.
- [N38] “Cooperation and Competition,” *MSRI workshop on Mathematics of Relaying and Cooperation in Communication Networks*, Mathematical Sciences Research Institute, Berkeley, CA, April 2006.
- [N39] “Wireless Resource Allocation Games,” invited keynote talk, *2nd Workshop on Resource Allocation in Wireless NETWORKS (RAWNET 2006)*, Boston MA, April 2006.
- [N40] “A Game Theoretic Analysis of Distributed Spectrum Sharing,” *INFORMS Annual Meeting 2005*, San Francisco, CA, Nov. 2005.
- [N41] “Spectrum Sharing Games,” *20th IEEE Computer Communication Workshop*, Huntington Beach, CA, Oct. 2005.
- [N42] “Asymptotic Power-Delay Trade-offs for Wireless Transmission Scheduling,” *13th INFORMS Applied Probability Conference*, Ottawa, Canada, July 2005.
- [N43] “Spectrum Sharing Games,” *IMA 2005 Summer Program: Wireless communication*, Institute for Mathematics and its Applications, Minneapolis, MN, June 2005.

- [N44] "Spectrum Sharing Auctions," *Workshop on Mathematical Modeling and Analysis of Computer Networks*, IFIP Networking 2005, Waterloo, Ontario, Canada, May 2005.
- [N45] "Power and Quality of Service Trade-offs in Wireless Networks," *IMA 'Hot Topics' Workshop on Wireless Networks*, Institute for Mathematics and its Applications, Minneapolis, MN, August 2001.

Invited Lectures in Industry and Academia

- [L1] "Hearing Range and Inter-packet Gap Trade-offs in V2X Networks," Futurewei University Days, August 2019.
- [L2] "5G Spectrum Sharing: A Network Economics View," *IEEE 5G Webinar*, August 2018.
- [L3] "Resource Scheduling and Congestion Control in C-V2X," Huawei University Days, August 2018.
- [L4] "The sharing economics of wireless spectrum," Roberson and Associates, April 2018.
- [L5] "The sharing economics of wireless spectrum," Nokia Technology Leadership Council seminar series, July 2017.
- [L6] "The Sharing Economics of Wireless Spectrum," Purdue University, July 2017.
- [L7] "A Permit-based Approach for Unlicensed Access," Huawei University Days, August 2016.
- [L8] "Competition and Investment with Shared Spectrum," Penn, ESE Colloquia Series, Dec. 2015.
- [L9] "Spectrum Economics," Univ. of Illinois Chicago, ECE Seminar Series, Oct. 2015.
- [L10] "Competition and Shared Spectrum," Huawei University Days, August 2015.
- [L11] "Observational Learning with Noise," Chinese University Hong Kong, Dept. of Information Engineering, June 2015.
- [L12] "Competition with Shared Wireless Spectrum," MIT, LIDS seminar Series, March 2015.
- [L13] "Observational Learning with Noise," UCLA Electrical Engineering Dept. Seminar, Feb. 2015.
- [L14] "Towards More Efficient Wireless Spectrum Use: Engineering, Policy and Economic Challenges," IEEE Communications Society Distinguished Lecture, IEEE Twin Cities Section, Nov. 2014.
- [L15] "Noisy Observational Learning," Texas A&M Fishbowl Seminar Series, Oct. 2014.
- [L16] "Investment, Competition and Sharing," Huawei University Days, August 2014.
- [L17] "The Price of Free Spectrum," MEDS faculty luncheon, Kellogg School of Management, Northwestern University, February 2013.
- [L18] "The Value of Free Spectrum," Decision, Control and Optimization Seminar, University of Illinois at Urbana-Champaign, March 2012.
- [L19] "The Value of Free Spectrum," Telecommunications, Control and Signal Processing Seminar, Texas A& M University, Feb. 2012.
- [L20] "The Value of Free Spectrum," Penn Seminar on Communications and Networking, University of Pennsylvania, March 2011.
- [L21] "On Real-time Markets for Wireless Spectrum," Northwestern EECS Theory Seminar, May 2010.
- [L22] "Wireless Resource Allocation: Scheduling, Feedback and Interference Games," Northwestern EECS Department "Meet the Faculty" seminar, April 2010.
- [L23] "Interference Games in Wireless Networks," Northwestern Institute on Complex Systems, Nov. 2009.

- [L24] “Information Theory Meets Game Theory on the Interference Channel,” University of California San Diego, Department of Electrical and Computer Engineering Seminar, October 2009.
- [L25] “Interference Channel Games,” Carnegie Mellon University, *ECE Communications group seminar*, May 2009.
- [L26] “Interference Channel Games,” UCLA, *Seminar Series in Electrical Engineering*, November 2008.
- [L27] “Real-time Wireless Spectrum Auctions,” University of Minnesota, Computer Science and Engineering Colloquia, Dec. 2007.
- [L28] “Real-time Wireless Spectrum Auctions,” University of Toronto, Communications Group Seminar, Sept. 2007.
- [L29] “Wireless Spectrum Sharing Games,” Samsung Information Systems America, San Jose, Ca, May 2007.
- [L30] “Economic-based Mechanisms for Dynamic Spectrum Sharing,” *Information Systems Seminar*, Stanford University, April 2007.
- [L31] “Economic-based Mechanisms for Dynamic Spectrum Sharing,” *HyNet Advanced Network Colloquium Series*, University of Maryland, College Park, March 2007.
- [L32] “Spectrum Sharing Games,” *ECE Distinguished Speaker Seminar Series*, Illinois Institute of Technology, April 2006.
- [L33] “Spectrum Sharing Games,” University of California at Berkeley, April 2006.
- [L34] “Spectrum Sharing Games,” *UIUC CSL Communication Group Seminar Series*, University of Illinois at Urbana-Champaign, Jan. 2006.
- [L35] “Spectrum Sharing Games,” *Kellogg Operations Seminar Series*, Kellogg School of Management, Northwestern University, Sept. 2005.
- [L36] “Spectrum Sharing Games,” *Communications and Signal Processing Laboratory (CSPL) Seminar Series*, University of Michigan, Ann Arbor, MI, April 2005.
- [L37] “Spectrum Sharing Games,” *Laboratory for Information and Decision Systems (LIDS) Seminar*, MIT, Cambridge, MA, March 2005.
- [L38] “Spectrum Sharing Games,” *Center for Wireless Systems and Applications (CSWA) Seminar Series*, Purdue University, March 2005.
- [L39] “Distributed Techniques for Wireless Resource Allocation,” *CAM/EE Seminar Series on Network Communications and Information Processing*, University of Notre Dame, October 2004.
- [L40] “Random Thoughts on Teaching,” ECE department, Northwestern, annual “best teaching award” lecture, May 2003.
- [L41] “Channel Aware Resource Allocation in Wireless Networks - Centralized and Distributed Approaches,” Communications and Networking Seminar, Yale University, March 2003.
- [L42] “Cross-layer Resource Allocation and Scheduling in Wireless Networks,” Bell Laboratories – Lucent Technologies, Murray Hill, NJ, June 2002.
- [L43] “Resource Allocation Problems in Wireless Networks,” *United Technologies Sponsored Seminar Series*, Boston University, Boston, MA, February 2002.
- [L44] “Power and Delay Trade-offs in Mobile Wireless Networks,” Mathematics of Communication Networks Group, Motorola, Arlington Heights, IL, January 2001.
- [L45] “Dynamic Resource Allocation in Wireless Networks,” Northwestern University Technology Update, April 2001.

Conference Tutorials/Short-courses

- [U1] R. Berry, “Wireless Network Economics,” 1/2 day course presented as part of the *NSF WiFiUS Summer School*, Boston, MA, 2018.

- [U2] R. Berry, "Economic Models of Dynamic Spectrum Sharing," 1/2 day course presented as part of the first *NSF WiFiUS Summer School*, Oulu, Finland, June 25-27, 2012.
- [U3] R. Berry and M. Honig, "Dynamic Spectrum Markets," 1/2 day tutorial presented at the *IEEE International Dynamic Spectrum Access Networks symposium (IEEE DySPAN 2011)*, Aachen, Germany, May 3-6, 2011.
- [U4] R. Berry, "Dynamic Spectrum Sharing Mechanisms," 3 hour invited short course, *Advanced Network Sciences Summer Lecture Series*, University of California San Diego, Aug. 2007.
- [U5] R. Berry and P. Marbach, "Resource Allocation and Quality of Service for High Speed Wireless Data Networks," 1/2 day tutorial presented at *IEEE Wireless communication and Networking Conference*, New Orleans, LA, March 2005.

Theses Supervised

- [T1] Xu Wang, "Wireless Spectrum: Policy, Economics, and Applications," Ph.D. Thesis, Northwestern University, August 2019.
- [T2] Hao Ge, "Network Resource Allocation: Secrecy Games and Mechanisms with Limited Information Exchange," Ph.D. Thesis, Northwestern University, June 2019.
- [T3] Liu Cao, "Simulation and Analysis of Vehicle-To-Vehicle (V2V) Communications," M.S. Thesis, June 2019.
- [T4] Jie Hu, "Performance Analysis of V2V Communication Adopting DSRC for Safety Applications," M.S. Thesis, June 2019.
- [T5] Tho Le, "Bayesian Observational Learning: When More Information Can Fail," Ph.D. Thesis, Northwestern University, Dec. 2017.
- [T6] Chang Liu, "Investment and Competition with Shared Spectrum," Ph.D. Thesis, Northwestern University, Dec. 2016.
- [T7] G. Askalidis, "Understanding the Dynamics of Electronic Word of Mouth," Ph.D. Thesis (co-supervised with N. Immorlica), Northwestern University, July 2016.
- [T8] Cheng Chen, "Pricing, Competition, and Resource Allocation in Heterogeneous Wireless Networks," PhD Thesis (co supervised with M. Honig and V. Subramanian), Northwestern University, June 2016.
- [T9] Amrta Bhanja, "Monte Carlo Simulation for Primary User Emulation Attack," M.S. Project, Northwestern University, March 2016.
- [T10] Ruijie Xu, "Games on Interference Channels with Eavesdroppers," M.S. Project, Northwestern University, May 2015.
- [T11] Tho Le, "The Value of Noise for Informational Cascades," M.S. Project (co-supervised with V. Subramanian), Northwestern University, May 2014.
- [T12] Liwen Liang, "Investment Models for Competition in Licensed Wireless Spectrum," M.S. Project, Northwestern University, March 2014.
- [T13] Motoki Mizoguchi, "Simulating an Information Cascade Model with Varying Private Signal Strengths," M.S. Project (co-supervised with V. Subramanian), Northwestern University, March 2014.
- [T14] Cheng Chen, "Distributed Interference Pricing in Wireless Networks with Local Cooperation," M.S. Project (co-supervised with M. Honig), Northwestern University, Dec. 2013.
- [T15] Suvarup Saha, "Interference Channels: Sum-capacity, Combinatorial Structure and Equilibria," Ph.D. Thesis, Northwestern University, June 2013 (joined Qualcomm).
- [T16] Lan Xing, "Simulation Study of SINR and Rate for Cellular Network with Full and Fractional Frequency Reuse," M.S. Project, Northwestern University, June 2013.
- [T17] Xiaochen Zhang, "Fast Simulation Based Inference in Social Networks," M.S. Project, Northwestern University, June 2013.

- [T18] Ka Hung Hui, "Peer-to-Peer State Exchange: from Medium Access Control to Diffusion in Social Networks," Ph.D. Thesis (co-supervised with D. Guo), Northwestern University, December 2012 (joined Google).
- [T19] Hang Zhou, "Resource Allocation and Service Competition in Spectrum Markets," Ph.D. Thesis (co-supervised with M. Honig), Northwestern University, June 2012 (joined Motorola Mobility).
- [T20] Changxin Shi, "Distributed Power and Beam Optimization for Wireless Interference Networks," Ph.D. Thesis (co-supervised with M. Honig), Northwestern University, December 2011 (joined Barclays).
- [T21] Tianyi Li, "Distributed Medium Access Control for Wireless Networks with Peer-to-Peer State Exchange," M.S. Project (co-supervised with D. Guo), Northwestern University, June 2011.
- [T22] Arjun Gopi, "Simulation of Interference Pricing Algorithm for Time-varying Channels," M.S. Project, Northwestern University, Dec. 2010.
- [T23] Jieying Chen, "Resource Allocation for the OFDMA Downlink with Limited Feedback," Ph.D. Thesis (co-supervised with M. Honig), Northwestern University, June 2010 (joined Google).
- [T24] Ning Wen, "Linear Ad Hoc Networks: Information Propagation, Reliability, and Delay," Ph.D. Thesis, Northwestern University, Dec. 2009 (joined Motorola).
- [T25] Junjik Bae, "Wireless Resource Allocation among Cooperative Relays and Non-cooperative Agents," Ph.D. Thesis (co-supervised with M. Honig), Northwestern University, Dec. 2008 (joined Boston Consulting).
- [T26] Changxin Shi, "Distributed Interference Pricing with MISO Channels," M.S. Project (co-supervised with M. Honig), Northwestern University, Dec. 2008 (continued for Ph.D.).
- [T27] Hang Zhou, "Bandwidth and Power Allocation in Gaussian Interference Channels", M.S. Project (co-supervised with M. Honig), Northwestern University, Dec. 2007 (continued for Ph.D.).
- [T28] Yishen Sun, "TCP Traffic Control over Access Networks," Ph.D. Thesis (co-supervised with C.C. Lee and A. Haddad), Northwestern University, Dec. 2006 (Joined Motorola, Inc.).
- [T29] Naveen Arulselvan, "Cross-layer Design for Retransmission Protocols in Wireless Networks," Ph.D. Thesis, Northwestern University, June 2006. (Joined Motorola, Inc.).
- [T30] Jianwei Huang, "Wireless Resource Allocation: Auctions, Games, and Optimization," Ph.D. Thesis (co-supervised with M. Honig), Northwestern University, October 2005. (Assistant Prof. at the Chinese University of Hong Kong.).
- [T31] Xiangping Qin, "Distributed Approaches for Exploiting Multi-user Diversity in Wireless Networks," Ph.D. Thesis, Northwestern University, July 2005. (Joined Samsung Information Systems America).
- [T32] Xiaoe Liu, "OPNET Simulation of TCP ACK Pacing," M.S. project, Northwestern University, April 2005. (Joined ISCO International).
- [T33] Ning Wen, "Wireless Networking and Travel Time Predictions for Vehicle-based Intelligent Transportation Systems," M.S. project, Northwestern University, May 2004 (continued for Ph.D.).
- [T34] Kung Piao Huang, "Fair Bandwidth Allocation Based on a Virtual Congestion Point mechanism," M.S. project (co-supervised with A. Haddad), Northwestern University, May 2004 (Joined Cheertek Inc., Taiwan).
- [T35] Peijuan Liu, "Utility-Based Resource Allocation for Wireless Networks in Static and Dynamic Environments," Ph.D. Thesis (co-supervised with M. Honig) Northwestern University, December 2003 (Joined Motorola Labs).
- [T36] Jianwei Huang, "Utility-Based Downlink Scheduling of Wireless Networks with Hybrid ARQ," M.S. project (co-supervised with M. Honig), Northwestern University, May 2003 (continued for Ph.D.).

- [T37] Naveen Arulselvan, “Efficient Power Allocations in Wireless ARQ Protocols,” M.S. project, Northwestern University, June 2002 (continued for Ph.D.).

Former Post-docs and Research Faculty Supervised

- Arnob Ghosh, post doc at Purdue.
- Vijay Subramanian, joined University of Michigan.
- Thanh Nguyen, co-supervised with M. Honig and R. Vohra, joined Purdue University.
- Yalin Sagduyu, co-supervised with D. Guo and M. Honig, joined Intelligent Automation, Inc.
- Hongxia Shen, co-supervised with M. Honig, joined Lawrence Berkeley National Lab.

Thesis Committees (Northwestern)

- [G1] A. Sankisa, “Neural Network Approaches for Video Transmission, Motion Estimation and Error Concealment,” (Supervised by A. Katsaggelos), Ph.D. Thesis, June 2019.
- [G2] B. Van Scoy, “Analysis and Design of Algorithms for Dynamic Average Consensus and Convex Optimization,” (Supervised by R. Freeman), Ph.D. Thesis, June 2017.
- [G3] T. Chen, “RGB-D SLAM for MAV Autonomous Indoor Navigation,” (supervised by A. Katsaggelos) M.S.Thesis, June 2017.
- [G4] X. Chen, “The Internet of Things: Fundamental Limits and Practical Algorithms,” (Supervised by D. Guo), Ph.D. Thesis, Sept. 2016.
- [G5] F. Teng, “Resource Management in Next Generation Networks: Optimization and Games,” (Supervised by D. Guo and M. Honig), Ph.D. Thesis, Dec. 2015.
- [G6] J. Watt, “Feature learning: novel algorithms and unifying perspectives,” (Supervised by A. Katsaggelos), Ph.D. Thesis, Sept. 2015.
- [G7] K. Zeineddine, “Resource Allocation Schemes for Cooperative Uplink Transmission in Mobile Broadband Networks,” (Supervised by M. Honig) PhD Thesis, Northwestern University, Aug. 2015.
- [G8] Z. Chen, “Multidimensional Signal Processing for Sparse and Low-Rank Problems,” (supervised by A. Katsaggelos) PhD Thesis, Northwestern University, June 2014.
- [G9] B. Ha, “An Approach to Prior-Free Mechanism Design,” (supervised by J. Hartline) PhD Thesis, Northwestern University, June 2013.
- [G10] L. Zhang, “Virtual Full Duplex Wireless Networks,” (supervised by D. Guo) PhD. Thesis, Northwestern University, Aug. 2012.
- [G11] G. Chang, “Packet Scheduling Algorithms for Configurable Network QoS,” (supervised by C.C. Lee) PhD. Thesis, Northwestern University, June 2012.
- [G12] M. Xu, “Limited Feedback and Information Exchange for Wireless Cellular Networks,” (supervised by D. Guo and M. Honig), Ph.D. Thesis, Northwestern University, Feb. 2012.
- [G13] E. Soyak, “Tracking Optimized Video Compression,” (supervised by A. Katsaggelos) Ph.D. Thesis, Northwestern University, March 2011.
- [G14] Y. Wu, “Active Set Algorithms for Large-scale Nonlinear Programming,” (Supervised by J. Nocedal), Ph.D. Thesis, Northwestern University, Oct., 2010.
- [G15] Y. Zhu, “Fading Interference Channels with Channel Uncertainties,” (Supervised by D. Guo and M. Honig), Ph.D. Thesis, Northwestern University, Aug., 2010.
- [G16] J. Luo, “Estimation of Hidden Markov Processes and Neighbor Discovery in Wireless Networks,” (Supervised by D. Guo), Ph.D. Thesis, Northwestern University, June, 2010.
- [G17] T. Nelson, “Decentralized Worst-Case Estimation and Control in Mobile Sensor Networks,” (Supervised by R. Freeman), Ph.D. Thesis, Northwestern University, June, 2010.

- [G18] E. Maani, "Cross-layer optimization for efficient video communication over reliable networks" (supervised by A. Katsaggelos), Ph.D. Thesis, Northwestern University, Dec. 2009.
- [G19] P. Yang, "Multi-agent Coordination by Decentralized Estimation and Control," (supervised by R. Freeman and K. Lynch) Ph.D. Thesis, Northwestern University, Oct. 2008.
- [G20] M. Agarwal, "Training and Limited Feedback Strategies for Fading Channels," (supervised by M. Honig and D. Guo) Ph.D. Thesis, Northwestern University, September 2008.
- [G21] A. Wolff, "Protocols, Architectures and Applications of Multi-Hop Wireless Networks," (supervised by C.C. Lee) Ph.D. Thesis, Northwestern University, Dec. 2007.
- [G22] P. Pahalawatta, "Downlink Packet Scheduling and Resource Allocation for Multiuser Video Transmission Over Wireless Networks," (supervised by A. Katsaggelos), Ph.D. Thesis, Northwestern University, Dec. 2007.
- [G23] E. Manni, "Error Resilient Video Coding for Robust Transmission over Mobile Networks," (supervised by A. Katsaggelos) M.S. Thesis, Northwestern University, May 2007.
- [G24] P. Yang, "Multi-agent Coordination by Decentralized Estimation and Control," (supervised by R. Freeman and K. Lynch) M.S. Thesis, Northwestern University, Dec. 2006.
- [G25] T. Eguchi, "A Security Analysis of Quantum Cryptographic protocol $\alpha\eta$," (supervised by H. Yuen) M.S. Thesis, Northwestern University, June 2006.
- [G26] W. Santipach, "Performance of Multiple-Input Wireless Channels with Limited Feedback," (supervised by M. Honig) Ph.D. thesis, Northwestern University, June 2006.
- [G27] A. Brooks, "Structural Similarity Quality Metrics in a Coding Context: Exploring the Space of Realistic Distortions," (supervised by T. Pappas) M.S. Thesis, Northwestern University, Feb. 2006.
- [G28] M. Agarwal, "Wideband Fading Channel Capacity with Training and Feedback," (supervised by M. Honig) M.S. project, Northwestern University, May 2005.
- [G29] M. Ruffolo, "The Development of Storage Requirements and the Analysis of Optimal Storage Placement for a Federated Digital Medical Imaging Network," (supervised by A. Sahakian) Ph.D. thesis, Northwestern University, June 2005.
- [G30] Huajing Shi, "Online Dynamic Traffic Assignment Based Algorithms for Managing Real-time Traffic Networks," (supervised by A. Ziliaskopoulos) Ph.D. thesis, Northwestern University, Department of Civil Engineering, December 2004.
- [G31] Yakun Sun, "Transmitter and Receiver Techniques for Wireless Fading Channels," (supervised by M. Honig) Ph.D. thesis, Northwestern University, June 2004.
- [G32] Zhu Li, "Rate-Distortion Optimal Video Summarization and Video Retrieval Based on Principal Component Space Geometry Matching," (supervised by A. Katsaggelos) Ph.D. thesis, Northwestern University, June 2004.
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- [G38] H. Lee, "Protocols and Analysis of Multiple-Layer Self-Organizing Wireless Networks," (supervised by C.C. Lee) Ph.D. thesis, Northwestern University, September 2003.

- [G39] C. Zhou, "Utility-Based Multi-cell CDMA Resource Allocation for Wireless Voice and Data," (supervised by M. Honig) Ph.D. thesis, Northwestern University, June 2002.
- [G40] C. Luna, "Video Quality and Network Efficiency Trade-offs in Video Streaming Applications," (supervised by A. Katsaggelos) Ph.D. thesis, Northwestern University, June 2002.
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- [G44] G. Rajappan, "Multiuser Signature Adaptation for DS-CDMA," (supervised by M. Honig) Ph.D. thesis, June 2001.
- [G45] W. Xiao, "Large System Performance of Linear Interference Suppression for DS-CDMA," (supervised by M. Honig) Ph.D. thesis, Northwestern University, May 2001.
- [G46] Y. Sun, "Reduced-rank Adaptive Equalization," (supervised by M. Honig) M.S. project, Northwestern University, January 2001.

External Thesis Committees

- [E1] A. Hota, "Impacts of Game-theoretic and Behavioral Decision-making on the Robustness and Security of shared Systems and Networks," Ph.D. Thesis, Purdue University, July 2017.
- [E2] M. Lofti, "Economics of Non-neutrality in the Internet," Ph.D. Thesis, University of Pennsylvania, May 2017.
- [E3] A. Ghosh, "Evolution of Secondary Spectrum Market," Ph.D. Thesis, University of Pennsylvania, May 2016.
- [E4] D. J. Kampeas, "Capacity and Algorithms for Distributed Opportunistic Scheduling," (supervised by Prof. A. Cohen), Ph.D. Thesis, Ben-Gurion University, Israel, 2013.
- [E5] E. Nekouei, "Throughput Scaling Laws in Cognitive Multiple Access Networks," (Supervised by Prof. S. Dey) Ph.D. Thesis, University of Melbourne, Australia, June 2013.
- [E6] L.M. Law, "Game Theoretical Analysis of Congested Wireless Networks," (Supervised by Prof. J. Huang) Ph.D. Thesis, The Chinese University of Hong Kong, Feb. 2013.
- [E7] E. Ciftcioglu, "Wireless Relay Networks with Stochastic Arrivals," (Supervised by Prof. A. Yener), Ph.D. Thesis, the Pennsylvania State University, April. 2012.
- [E8] N. Badruddin, "Optimal Power Allocation in Interference Networks," (Supervised by Prof. S. Hanly and Prof. J. Evans), Ph.D. Thesis, University of Melbourne, Australia, March 2011 (External examiner).
- [E9] K. Moshksar, "Randomized Resource Allocation in Decentralized Wireless Networks," (Supervised by Prof. Amir K. Khandani), Ph.D. Thesis, University of Waterloo, Feb. 2011 (External examiner).
- [E10] S. Goel, "Delay Constrained Communication Over Fading Channels: A Queued-code Approach," (Supervised by Prof. Rohit Negi), Ph.D. Thesis, Carnegie Mellon University, May 2009. (External examiner).
- [E11] J. Cao, "Distributed Multiple Access and the Impact of Feedback on Communication Systems," (Supervised by Prof. Edmund Yeh) Ph.D. Thesis, Yale University, July 2008. (External examiner)
- [E12] J. Yuan, "Optimization Techniques for Wireless Networks," (supervised by Prof. Wei Yu), Ph.D. Thesis, University of Toronto, Sept. 2007. (External examiner)

- [E13] T. Thanabalasingham, “Resource Allocation in OFDM Cellular Networks,” (supervised by Prof. S. Hanly) Ph.D. Thesis, University of Melbourne, Australia, Dec. 2006. (External examiner).

Current Students and Post-Docs

- Yining Zhu (PhD)
- Brendan Badia (PhD, joint with E. Wei)
- Pawan Poojary (PhD)
- Abdurrahman Fouda (PhD)
- Haoran Yu (Post Doc, joint with E. Wei)

Northwestern University Committees and Service

- Chair, Department of Electrical and Computer Engineering 2019-present.
- Director, Master of Science in Information Technology (MSIT) program, 2015-present.
- EECS Associate Chair for Undergraduate Program 2011-2018.
- One-book Northwestern Committee, 2016-17.
- EEC Department Search Committee (Junior Chair in Computer Science) 2015.
- EECS Department Search Committee (Communications, Networking and Control) 2012-14.
- McCormick Promotions and Tenure Committee, 2012-2014.
- Northwestern Limited Submissions Advisory Committee, 2012-13.
- McCormick Curriculum Committee, 2006-present.
- Chair, EECS EE Undergraduate Curriculum Committee, 2006-2015.
- EECS Graduate Committee, 2001-present.
- ECE/EECS Computing Committee, 2000-2006.
- ECE Department Search Committee (Networks area) 2002-2004.
- Organizer, ECE department “Communications and Networking Seminar Series,” 2003-2005.
- ECE EE Undergraduate Curriculum committee, 2000-2001.
- Faculty Advisory Board, M.S. in Information Technology (MSIT) Program, 2007-present.