Zhongyuan Zhao, Ph.D.

Curriculum Vitae

Dept. of Electrical and Computer Engineering
Rice University
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Houston, TX 77005

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ORCID: 0000-0003-0346-8015
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EDUCATION

Ph.D. Department of Computer Science and Engineering, University of Nebraska-Lincoln, 2019

Dissertation: *Improving Spectrum Efficiency by Exploiting User and Channel Behaviors for Next Generation Wireless Networks*

Advisor: Dr. *Mehmet Can Vuran*

M.Sc. Department of Electronic Engineering, University of Electronic Science and Technology of China, 2009

B.Sc. Department of Electronic Engineering, University of Electronic Science and Technology of China, 2006

PROFESSIONAL APPOINTMENT

Dec. 2019- Postdoctoral Research Associate, Rice University

2013-2019 Graduate Research & Teaching Assistant, University of Nebraska-Lincoln

2011-2013 (Radio Frequency) Integration and Verification Engineer, Ericsson, Chengdu, China

2009-2011 Digital Signal Processing Software Engineer, ArrayComm, Chengdu, China

PROFESSIONAL DESIGNATION

Member of Institute of Electrical and Electronics Engineers (IEEE), 2013-present

IEEE Communications Society
IEEE Signal Processing Society

RESEARCH EXPERIENCE

2019-Present *Autonomous Networking for Multi-domain Operations*, Houston, Texas,
Advisor: Santiago Segerra

Develop machine learning techniques for distributed resource allocation in wireless ad-hoc networks that are self-organized, robust, and resilient in near-peer adversarial environment. Develop distributed link scheduling schemes based on graph neural networks (deep learning over networks) and distributed computing, machine learning techniques for combinatorial optimization on graphs (networks), and reinforcement learning techniques for pipelines containing blackbox combinatorial solver.

2019-2019 *Computational Biology for Drug Repurposing*, Lincoln, Nebraska, Advisor: Thomas Helikar

Develop Python software to analyze human genome microarray data and molecular interaction network to facilitate drug repurposing for gene-related diseases.

2017-2019 *Cognitive Secure Cloud Radio Access Network for Efficient Spectrum Sharing*, Lincoln, Nebraska, Advisor: Mehmet Can Vuran

Work with a large team to build a large-scale testbed of cloud radio access network, which offers sub-6GHz experimental cellular, vehicle-to-infrastructure, and underground-to-aboveground communications in realistic environments across two university campuses and a public street. Research machine learning techniques for radio frequency signal processing and dynamic spectrum sharing. Experimental research on 5.8GHz vehicle-to-barrier channels for safety-critical applications.

2013-2017 *Cog-TV: Business and Technical Analysis of Cognitive Radio TV Sets for Enhanced Spectrum Access*, Lincoln, Nebraska, Advisor: Mehmet Can Vuran

Seek regulatory innovation in dynamic television (TV) spectrum access by addressing the technical, operational, and regulatory challenges associated to cooperative TV spectrum sharing between TV network operators and secondary wireless networks. The outcomes include a thorough analysis of the amount and characteristics of TV band spectrum holes in 274 U.S. cities, a dynamic pricing scheme for network operations under stochastic capacity, and a model of aggregate interference for managing the shared TV spectrum.

2011-2013 *Remote Radio Head in 4th Generation LTE Base-station* (Ericsson), Chengdu, China

Conduct radio performance, environmental, and certification tests for the radio frontend of the 4th generation Long-Term Evolution (LTE) cellular base-station. Lead a team of 5 engineers in developing an in-house test automation software. Educate colleagues in the Integration and Verification Department in Python programming for radio frequency test automation.

2009-2011 *Digital Signal Processing Software in 4th Generation Cellular Base-station* (ArrayComm), Chengdu, China

Develop and optimize digital signal processing software in WiMAX and LTE cellular base-stations. Implement the physical layer protocols, beamforming, MIMO, MU-MIMO, channel estimation, source & channel coding, and real-time operating system (RTOS) on flagship multi-core DSP processors.

2006-2009 *Channelized Software-Defined Radio Receiver*, Chengdu, China

Develop the intermediate frequency sub-system of a channelized multi-antenna software-defined radio receiver for electronic reconnaissance, including hardware design and field-programmable gate array (FPGA) software. Design the FPGA sub-system comprises of high-speed filter-banks and data interfaces, and control unit.

RELEVANT SKILLS

Quantitative	Probability and stochastic processes, statistics, machine (deep) learning, optimization.
Programming	Python (Tensorflow, PyTorch), Matlab, R, SAS, C/C++, Javascript, Assembly, Verilog, SQL, Scripting languages in Excel, Linux, and OSX.
Computing	Familiar with Linux & OSX; experienced in programming on GPU, DSP, FPGA, SoC, and high-performance computing cluster (HPCC).
Languages	Native in Chinese; Proficient in English.
Others	Technical writing and presentation, software development process.

PUBLICATIONS

Under Review

Zhongyuan Zhao, Gunjan Verma, Chirag Rao, Ananthram Swami, and Santiago Segarra, "Link Scheduling using Graph Neural Networks," *IEEE Journal of Selected Areas in Communications,* submitted to.

Peer Reviewed Journal Articles

2021 **Zhongyuan Zhao**, Mehmet C. Vuran, Fujuan Guo, and Stephen Scott, "Deep-Waveform: A Learned OFDM Receiver Based on Deep Complex-Valued Convolutional Networks," in IEEE Journal on Selected Areas in Communications, vol. 39, no. 8, pp. 2407-2420, Aug.

2021 **Zhongyuan Zhao**, Mehmet C. Vuran, Baofeng Zhou, Mohammad M.R. Lunar, Zahra Aref, David P. Young, Warren Humphrey, Steve Goddard, Garhan Attebury, and Blake France, "A City-Wide Experimental Testbed for The Next Generation Wireless Networks," *Ad Hoc Networks*, Vol. 111, pp102305, Feb.

2019 Demet Batur, Jennifer Ryan, **Zhongyuan Zhao**, and Mehmet C. Vuran, "Dynamic Pricing of Wireless Internet Based on Usage and Stochastically Changing Capacity," *Manufacturing and Service Operations Management*, Published Online, Feb.

2019 **Zhongyuan Zhao**, Mehmet C. Vuran, Demet Batur, and Eylem Ekici, "Shades of White: Impacts of Population Dynamics and TV Viewership on Available TV Spectrum," *IEEE Transactions on Vehicular Technology*, Vol. 68, No. 3, pp2427-2442, Jan.

2018 Samil Tamel, Mehmet C. Vuran, Mohammad M. R. Lunar, **Zhongyuan Zhao**, Abdul Salam, Ronald K. Faller, and Cody Stolle, "Vehicle-to-Barrier Communication During Real-World Vehicle Crash Tests," *Computer Communications*, Vol 127, pp. 172-186, Sep.

2007 Haihong Tang, **Zhongyuan Zhao**, "DSP and CPLD-based Digital AC Soft Starter," *Automation Information*, (5), pp.53-55.

Conference Proceedings & Demo

2022 **Zhongyuan Zhao**, Gunjan Verma, Ananthram Swami, and Santiago Segarra, "Delay-oriented Distributed Scheduling using Graph Neural Networks," IEEE *International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2022)*, accepted.

2022 **Zhongyuan Zhao**, Gunjan Verma, Ananthram Swami, and Santiago Segarra, "Distributed Link Sparsification for Scalable Scheduling using Graph Neural Networks," IEEE *International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2022)*, accepted.

2021 **Zhongyuan Zhao,** Gunjan Verma, Chirag Rao, Ananthram Swami, and Santiago Segarra, "Distributed Scheduling using Graph Neural Networks," Accepted to IEEE *International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2021)*, pp. 4720-4724, Toronto, Ontario, Canada (virtual conference), Jun. 6-11.

2019 **Zhongyuan Zhao**, Mehmet C. Vuran, Zahra Aref, David P. Young, Warren Humphrey, Steve Goddard, Garhan Attebury, Blake France, Baofeng Zhou, and Mohammad M. R. Lunar, "A City-Wide Experimental Testbed for Next Generation Wireless Networks," IEEE Int. *Balkan Conference on Communications and Networking (BalkanCom'19)*, Skopje, North Macedonia, Jun. 10-12.

2018 **Zhongyuan Zhao**, and Mehmet C. Vuran, "Modeling Aggregate Interference with Heterogeneous Secondary Users and Passive Primary Users for Dynamic Admission and Power Control in TV Spectrum," *IEEE Int. Balkan Conference on Communications and Networking (BalkanCom'18)*, Podgorica, Montenegro, Jun. 6-8.

2017 D. Rempe, M. Snyder, A. Pracht, A. Schwarz, T. Nguyen, M. Vostrez, **Z. Zhao**, and M. C. Vuran, "A Cognitive Radio TV Prototype For Effective TV Spectrum Sharing," *IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, pp. 117-118, Baltimore, MD, March 6-9.

2014 **Zhongyuan Zhao**, Mehmet C. Vuran, Demet Batur, Eylem Ekici, "Ratings for Spectrum: Impacts of TV Viewership on TV Whitespace," *IEEE Global Communications Conference (GlobeCom'14)*, pp.941-947, Austin, TX, Dec. 8-12.

2009 Hongping Hu, **Zhongyuan Zhao**, "A Real-Time High Resolution Image Compression System Based on ADV212," *2nd International Congress on Image and Signal Processing (CISP'09)*, pp.1-4, Tianjin, China, Oct.

PATENTS

2016 **Zhongyuan Zhao**, Weixu Wang, Luping Pan, "PLL and Adaptive Compensation Method in PLL," International Patent, US9496881 B2, EP3047573 A4, CN105580278A, Issued Date: May.

2012 Zishu He, **Zhongyuan Zhao**, Jianzhong Zhang, Ting Chen, Kexin Jia, "Method and Apparatus for An Implementation of Polyphase Filter Structure," China, CN101958697B, Issued Date: Jul.

AWARDS

2006-2009 National Scholarship, UESTC (China)

2006 Outstanding Graduate, UESTC

2005 National 1st-class Prize, National Undergraduate Electronic Design Contests (China)

CONFERENCE PARTICIPATION

2021 **Zhongyuan Zhao,** Gunjan Verma, Chirag Rao, Ananthram Swami, and Santiago Segarra, "Distributed Scheduling using Graph Neural Networks," Accepted to IEEE *International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2021)*, pp. 4720-4724, Toronto, Ontario, Canada (virtual conference), June 6-11.

2017 D. Rempe, M. Snyder, A. Pracht, A. Schwarz, T. Nguyen, M. Vostrez, **Z. Zhao**, and M. C. Vuran, "A Cognitive Radio TV Prototype For Effective TV Spectrum Sharing," IEEE International Symposium on Dynamic Spectrum Access Networks, pp. 117-118, Baltimore, MD, March 6-9.

2014 **Zhongyuan Zhao**, Mehmet C. Vuran, Demet Batur, Eylem Ekici, "Ratings for Spectrum: Impacts of TV Viewership on TV Whitespace," IEEE Global Communications Conference, pp.941-947, Austin, TX, December 8-12.

TEACHING EXPERIENCE

University of Nebraska-Lincoln, Graduate Teaching Assistant

Data Structure and Algorithms (fall 2017, spring 2019)

Multi-Agent System (fall 2017)

University of Electronic Science and Technology of China, Teaching Assistant

Electronic Design Training Program (fall 2005 - summer 2007, 2-year program)

PROFESSIONAL SERVICE

Conference Activities

Technical Program Committee Member*, IEEE Vehicular Technology Conference 2020-Fall*

Peer Reviewer

IEEE Transactions on Wireless Communication
IEEE Transactions on Mobile Computing
IEEE Journal on Selected Areas in Communications
IEEE Communications Surveys and Tutorials
IEEE Transactions on Vehicular Technology
IEEE Transactions on Multimedia
IEEE Communications Letters
The International Journal of Computer and Telecommunications Networking
Wireless Communications and Mobile Computing
IEEE InfoComm
IEEE ICC

IEEE GlobeCom
IEEE DySPAN
International Conference on Distributed Computing Systems
IEEE Vehicular Technology Conference

To Profession

Secretary, Graduate Student Association, Department of Computer Science and Engineering, University of Nebraska-Lincoln, 2017-2018

PROFESSIONAL DEVELOPMENT/CERTIFICATIONS

2018 Coursera 5-course specialization: Deep Learning, Specialization Certificate.

2018 Coursera 5-course specialization: Foundations of Management, 3/5 Certificates.

2017 Certificate of Completion, Institute for International Teaching Assistants, UNL.