Wenhan Zhang

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My research primarily revolves around wireless communication and networks, with a recent emphasis on the application of artificial intelligence (AI) and machine learning (ML) models in the context of wireless systems. *No sponsorship required*

Education

University of Arizona *Aug. 2018 – Present*
PhD in Electrical and Computer Engineering Tucson, AZ

Syracuse University *Aug. 2016 – May 2018*
MS in Electrical Engineering Syracuse, NY

Hefei University of Technology *Aug. 2012 – May 2016*
BS in Electrical Engineering Hefei, China

Experience

Research Scientist Internship *May 2022 -— Aug. 2022*
Intel Labs Portland, OR

- Implemented wireless Single-Input Single-Output (SISO) and Multiple-Input Multiple-Output (MIMO) detection techniques for various Quadrature Amplitude Modulations (QAMs)
- Modified probabilistic machine learning algorithms, such as ADVI, for QAM detection

Research Assistant *June 2019 – Present*
University of Arizona Tucson, AZ

- Conducted research in PHY implementation of commercial protocols, including LTE, 5G NR, and 802.11ax
- Designed detection of radio frequency (RF) in-phase (I)/quadrature (Q) samples, taking into account coding, orthogonal frequency division multiplexing (OFDM), and channel modeling
- Constructed AI/ML models for wireless signal classification across shared spectrum bands, encompassing protocol, modulation schemes, and coding rate identification
- Developed secure RF classifiers to defend against AI/ML threats, including adversarial techniques such as FGSM, PGD, DeepFool, C&W, GAN, and others
- Conducted research on end-to-end (E2E) delay estimation approach in the mobile computing systems
- Established IP address-based measurements to assess propagation, transmission, processing, and queuing delays between a mobile device, base station, and an AWS cloud center
- Designed the computational task offloading algorithms to optimize the user-experienced latency
- Simulated MAC layer contention in a Wi-Fi system, and analyzed QoS in the network layer

Teaching Assistant *Aug. 2018 – May 2019*
University of Arizona Tucson, AZ

- Facilitated lectures and conducted coding lab sessions on C programming using Visual Studio and Xcode

Teaching Assistant *Aug. 2017 – May 2018*
Syracuse University Syracuse, NY

- Assisted with hardware experiments with protoboard, electronic components, signal generators, oscilloscopes, and microcontrollers (specifically, Arduino)
- Helped implementing software simulations using NI Multisim

Skills

Languages and Tools: Matlab, Python, C/C++, R, Keras, Tensorflow, Pytorch, Scikit-learn, Docker, Git, SQL

Research Areas: Wireless Communication (PHY/MAC), Computer Networks (TCP/IP), Digital Signal Processing, Robustness of Machine Learning, Deep Learning

Relevant Coursework

PhD: Statistics Regression Analysis, Wireless Protocols, Network and Information Security, Advanced Computer Networks, Computer Systems and Network Evaluation, Applications of Machine Learning, Fundamentals of Optimization, Deep Neural Networks, Advanced Topics in Artificial Intelligence. **MS**: Digital Communications, Wireless Communications, Digital Signal Processing, Sensor and Measurements, System Operation and Plan, Probabilistic Methods. **BS**: Data Structures, Signals and Systems, Electromagnetics, Circuits Theory, Computer Architecture, Logic Design, Transient and Steady State Analysis.

Honors and Awards

NSF Student Travel Grant to attend IEEE ICC 2022, Seoul, South Korea

University of Arizona GPSC Travel Grant to attend IEEE MILCOM 2021, San Diego, CA

IEEE ComSoc Travel Grant to attend IEEE MILCOM 2021, San Diego, CA

Graduate Tuition Scholarship at The University of Arizona, 2018-2020

University Science and Technology Award of Hefei University of Technology, 2016

University Scholarship of Hefei University of Technology, 2013

Publications

- Mingjie Feng, **Wenhan Zhang**, and Marwan Krunz, "Dynamic spectrum access in non-stationary environments: A DRL-LSTM integrated approach", *Proc. of the International Conference on Computing, Networking and Communications (ICNC): AI and Machine Learning for Communications and Networking*, Feb. 2023.
- **Wenhan Zhang** and Marwan Krunz, "Machine learning based protocol classification in unlicensed 5 GHz bands," *Proc. of the IEEE ICC Conference Workshop*, Seoul, South Korea, May 2022.
- Marwan Krunz, **Wenhan Zhang**, and Gregory Ditzler, "Application of adversarial machine learning in protocol and modulation misclassification", *Proc. of the Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications Conference (part of SPIE Defense and Commercial Sensing Symposium)*, April 2022.
- **Wenhan Zhang**, Marwan Krunz, and Gregory Ditzler, "Intelligent jamming of deep neural network based signal classification for shared spectrum," *Proc. of the IEEE MILCOM Conference* – Track 5, San Diego, Nov. 29 – Dec. 2, 2021.
- Mingjie Feng, Marwan Krunz, and **Wenhan Zhang**, "Joint task partitioning and user association for latency minimization in mobile edge computing networks," *IEEE Transactions on Vehicular Technology*, vol. 70, no. 8, pp. 8108-8121, Aug. 2021.
- **Wenhan Zhang**, Mingjie Feng, Marwan Krunz, and Amir Abyaneh, "Signal detection and classification in shared spectrum: A deep learning approach," *Proc. of the IEEE INFOCOM 2021 Conference*, Online, May 2021 (acceptance rate 19.9%).
- Mingjie Feng, Marwan Krunz, and **Wenhan Zhang**, "Task partitioning and user association for latency minimization in mobile edge computing networks," *Proc. of the IEEE International Workshop on Intelligent Cloud Computing and Networking (ICCN 2021) in conjunction with the IEEE INFOCOM 2021 Conference*, Online, May 2021.
- **Wenhan Zhang**, Mingjie Feng, Marwan Krunz, and Haris Volos, "Latency prediction for delay-sensitive V2X applications in mobile cloud/edge computing systems," *Proc. of the IEEE GLOBECOM Conference*, Taipei, Taiwan, Dec. 2020.

Professional Service

IEEE Journal on Selected Areas in Communications (JSAC) - Reviewer

IEEE Transactions on Mobile Computing (TMC) - Reviewer

IEEE Transactions on Communications (TCOM) - Reviewer

Elsevier Computer Communications - Reviewer