Zhibin Zou

+1(518)334-0810 | zzou2@albany.edu | www.zhibinzou.com | zhibin-zou-8665851a4 | Albany, NY, USA

Education

University at Albany, State University at New York *Albany, NY, USA*

Ph.D. in Electrical and Computer Engineering (GPA 4.0/4.0) Sep. 2019 - Present

- Advised by Weifu Wang in Robotics from Sep. 2019 - June. 2021
- Advised by Aveek Dutta in Wireless Communication from June. 2021 - Present
- Selected Courses: Advanced Digital Communication, Modern Wireless Network, Machine Learning and Information Theory, Probability and Random Process, Digital Signal Processing, Statistical Signal Processing, Engineering Optimization, Parameter Estimation and Signal Detection Theory, Discrete Mathematics with Applications, Cyber-Physical Systems, Linear Control Theory, Robotics.

Xidian University *Xi'An, China*

Master of Signal and Information Processing (GPA: 3.75/4.0) Sep. 2016 - Jun. 2019

Xidian University *Xi'An, China*

Bachelor of Electrical and Computer Engineering (GPA: 3.35/4.0) Sep. 2012 - Jun. 2016

Publications

Preprints

[1] **Z Zou**, A Dutta. "Waveforms for xG Non-Stationary Channels, " *IEEE Communications Magazine* (Major Revision)

[2] **Z Zou**, I Amarasekara, A Dutta. "Learning to Decompose Asymmetric Channel Kernels for Generalized Eigenwave Multiplexing," (Submitted to IEEE INFOCOM 2024)

[3] **Z Zou**. "Optimizing towards the best insertion-based error-tolerating joints," (Submitted to IEEE ICRA 2024)

[4] **Z Zou**, A Dutta. "Beyond MIMO-OTFS: Eigenwave Multiplexing in Space-Delay-Doppler Domain," (In writing)

[5] **Z Zou**, M Careem, A Dutta, N Thawdar. "Generalization Limits of Neural Network Receivers with BER bounds, " (In writing)

Peer-reviewed

[1] **Z Zou**, A Dutta. "Multidimensional Eigenwave Multiplexing Modulation for Non-stationary Channels," *in Proc. IEEE Global Communications Conference (GLOBECOM)*, to appear, 2023

[2] **Z Zou**, A Dutta. "Capacity Achieving by Diagonal Permutation for MU-MIMO channels," *in Proc. IEEE Global Communications Conference (GLOBECOM)*, to appear, 2023

[3] **Z Zou**, M Careem, A Dutta, N Thawdar. "Joint Spatio-Temporal Precoding for Practical Non-Stationary Wireless Channels, " *IEEE Transactions on Communications (TCOM)*, vol. 71, no. 4, pp. 2396 - 2409, 2023

[4] **Z Zou**, X Wei, D Saha, A Dutta, G Hellbourg. "SCISRS: Signal Cancellation using Intelligent Surfaces for Radio Astronomy Services," *in Proc. IEEE Global Communications Conference (GLOBECOM), 2022*

[5] **Z Zou**, M Careem, A Dutta, N Thawdar. "Unified Characterization and Precoding for Non-Stationary Channels," *in Proc. IEEE International Conference on Communications (ICC), 2022* [**Best Paper Award**]

[6] **Z Zou**, L Song, X Cheng. "Labeled box-particle CPHD filter for multiple extended targets tracking," *Journal of Systems Engineering and Electronics*, vol. 30, no.1, pp. 57-67, 2019

[7] X Cheng, L Song, H Ji, **Z Zou**. "Group target tracking algorithm based on labeled box particle probability hypothesis density ," *Systems Engineering and Electronics*, vol. 41, no.8, pp. 1677-1685. 2019

[8] X Cheng, L Song, **Z Zou**. "Multiple group target tracking with evolving networks and labeled box particle PHD filter," *in Proc. 30th Chinese Control And Decision Conference (CCDC), 2018*

[9] **Z Zou**, L Song, X Cheng. "Labeled box-particle PHD filter for multi-target tracking," *in Proc. IEEE International Conference on Computer and Communications (ICCC), 2017*

Patents

[1] L Song, Y Pan, **Z Zou**, et al. "Passive Box-particle PHD multi-target tracking based on TDOA," *CN Patent*, Application Number 201810825869.8, Patent Number CN108981707B (Granted)

[2] L Song, H Cent, Y Pan, P Yang, **Z Zou**, et al. "A evaluation for the multple group and extended target ellipse shape estimation," *CN Patent*, Application Number 201811640647.5, Patent Number CN109683150B (Granted)

[3] L Song, P Yang, H Ceng, Y Pan, **Z Zou**, et al. "Front vehicles distance measuring based on deep learning," *CN Patent*, Application Number 201811322870.5, Patent Number CN109509223A (Filed)

Qualifications

- PhD Scholar on Deep Learning for Wireless Communication.
- Best paper award in the prestigious IEEE conference, two Chinese National Scholarship Awards, and two granted CN patents.
- 10+ technique publications on Wireless Communication, Signal Processing and Target Tracking.
- Experienced in wireless communication, with 7+ years of research experience and 6+ research projects related to Signal Processing and machine learning. Passionate about exploring and creating new knowledge.
- GPA 4.0/4.0 and strong knowledge of MIMO, OFDM, Wireless Communication, Precoding, Channel Decomposition, Interference Cancellation, and Signal Processing.
- Programming Skills in Matlab, Julia, and Python; Experimental skills in software-defined radio (SDR), single chip processors (Raspberry Pi) and micro-controllers (Arduino).

Research Projects

NSF CAREER: "Generalizing Deep Learning for Wireless Communication" *MESA Lab, SUNY Albany*

This project aims to generalizes the architecture of a Deep Learning (DL) based wireless transceiver that will consistently operate with low error rate in all types of wireless channels, but especially outperform the state of the art in future xG channels. My contributions of this work is summarized as: June. 2021 - Present

- Proposed a multidimensional eigenwave modulation for non-stationary channels which design carriers at eigen domain to achieve joint orthogonality across space, time-frequency, and delay-Doppler domain
- Give a low complexity implementation of Dirty Paper Coding based on the equivalence
- Ongoing work on the Auto encoder of HOGMT precoding

AFRL Visiting Faculty Research Program: "Channel prediction and precoding for non-stationary wireless channels" *MESA Lab, SUNY Albany*

This project aims to predict the real-time CSI at the transmitter by outdated CSI and do precoding to cancel interference for non-stationary channels. My contributions of this work is summarized as: June. 2020 - Nov 2021

- Derived a High-order Generalized Mercer's Theorem (HOGMT) for non-stationary channels decomposition
- Proposed a unified characterization method for non-stationary channels
- Proposed a HOGMT based spatio-temporal precoding to cancel spatial, temporal and jointly spatio-temporal interference

NSF SWIFT: "Collaborative RFI Cancellation for Radio Astronomy" *MESA Lab, SUNY Albany*

This project focuses on active interference cancellation at the telescope supported by active bidirectional collaboration between the telescope and neighboring cellular networks. Currently, I am working on June. 2022 - Present

- Ongoing work on modeling the autoencoder for RFI cancellation at telescope with shared RFI from the base station
- Ongoing work on the nonlinear expression for the RFI sharing by Bussgang theorem

NSF SWIFT: "SCISRS: Signal Cancellation using Intelligent Surfaces for Radio Astronomy Services" *MESA Lab, SUNY Albany*

The objectives of this project are to accurately estimate the RFI incident at the telescope and to configure the RIS so the reflected signal arriving at the telescope receiver precisely cancels the incident RFI. My contributions are: Apr. 2022 - Present

- Assisted in preparing the project proposal
- Proposed a phase and energy solution for RIS elements to cancel RFI
- Proposed a error bound for the given location error

NSF Collaborative Research: RI: Medium: " Robust Assembly of Compliant Modular Robots" *Wang's Lab, SUNY Albany*

This project explores how flexible robots can be designed to move and join together to form larger structures, such as temporary antennas, tent supports, bridges, or tunnel reinforcements. My contributions are: Apr. 2019 - Dec. 2020

- Defined the point-edge contact model for peg-in-hole problem
- Proposed an optimization for error-tolerating peg and socket joints with respect to insertion and stability

Random Finite Sets based Multi-target Tracking *Li's Lab Xidian University*

The objective of this project is to design Random Finite Sets (RFS) based filters for multi-target tracking, multiple extended targets tracking, and multiple group targets tracking. My contributions summarized as: Sep. 2016 - May. 2019

- Proposed a labeled box-particle Probability Hypothesis Density (PHD) filter for multi-target tracking
- Implement a Cardinalized Probability Hypothesis Density (CPHD) filter for multiple extended/group target tracking

Awards and Honors

Jun. 2022	**Young Gladiator**: "Funded by Institute for the Wireless Internet of Things at Northeastern University"
May. 2022	**Best Paper Award, IEEE ICC**: "IEEE ICC is the flagship conference of IEEE ComSoc"
Sep. 2020	**Granted Chinese Patents**: "Patents CN 108981707B and CN109683150B are granted"
Nov. 2018	**National Scholarship, China**: "Highest level scholarship for students in China"
Dec. 2017	**Excellent Graduate Student, Xidian University**
Nov. 2017	**National Scholarship, China**: "Highest level scholarship for students in China"

Experience

Research Assistant

MESA Lab, University at Albany, SUNY 2021-Present

Research focuses on Precoding, Modulation, Channel Decomposition, RFI Cancellation, RIS, Machine Learning

Research Assistant

Weifu Wang's Lab, University at Albany, SUNY 2019-2021

Research focuses on Robotics, Block Optimization

Research Assistant

Liping Song's Lab, Xidian University 2016-2019

Research focuses on Target Tracking, Random Finite Sets Theory, Box-Particle Filter

Service and Activities

- Invited to present my work at the Special Technical Session in IEEE ICC 2022
- Assisted in preparing the funded project NSF SWIFT #2229496 ($634,799.00)
- Reviewer of IEEE Transactions on Neural Networks and Learning Systems, Computational Intelligence and Neuroscience, Wireless Communications and Mobile Computing, Frontiers in Energy Research, Frontiers in Neurorobotics, IEEE International Conference on Communications, IEEE Globecom, IEEE/RSJ International Conference on Intelligent Robots and Systems, and International Conference on Computer Science and Application Engineering
- Student Member of IEEE, IEEE ComSoc, ACM

Skills

Expertise	MIMO, OFDM, Precoding, Signal Processing, Spectrum Analysis, Machine Learning, Target Tracking, Bayesian Filter
Instrument Skills	Raspberry Pi, Software Defined Radios (SDR), Blender
Programming	Matlab, Julia, Python
Languages	English, Chinese (Native)

References

- Prof. Aveek Dutta
  Assistant Professor, University at Albany SUNY, Albany, NY, USA
  +1(518)442-5083 adutta@albany.edu
- Prof. Dola Saha
  Assistant Professor, University at Albany SUNY, Albany, NY, USA
  +1(303)638-3752 dsaha@albany.edu