

XIAOLU ZENG

Postdoc Research Associate

Department of Electrical & Computer Engineering University of Maryland, College Park, MD, USA.

Principal Scientist

Origin Wireless AI Inc., Greenbelt, MD, USA.

✉ xlzeng09@umd.edu 🌐 <https://xiaolu1263.github.io/>

RESEARCH INTERESTS

Target Detection, Tracking and Localization, Wireless sensing, 5G millimeter wave (mmWave) communication and applications, Massive MIMO Systems, Intelligent Recognition and Classification, Advanced Driver Assistance Systems (ADAS)...

EDUCATION

Xidian University, China

Ph.D. in Information and Communication Engineering

Aug. 2014 - Jun. 2020

Harbin Institute of Technology, China

B.S. in Electronic Information Engineering

Aug. 2010 - Jun. 2014

University of Maryland College Park, USA

Joint Ph.D. student in Electric and Computer Engineering

Sep. 2017 - Jun. 2020

ACADEMIC & INDUSTRY EXPERIENCE

Department of Electrical & Computer Engineering, University of Maryland, College Park, MD, USA

- Postdoc Research Associate (*Advisor: Prof. K. J. Ray Liu*) *Jul. 2020 - Present*
- Faculty Assistant (*Advisor: Prof. K. J. Ray Liu*) *Dec. 2019 - Jun. 2020*
- Research Scholar (*Advisor: Prof. K. J. Ray Liu*) *Sep. 2017 - Sep. 2019*
 - Time Reversal Based High Accuracy Localization and Tracking ([see 🖱](#))

Origin Wireless AI, Inc., Greenbelt, MD, USA

- Principle Scientist *Mar. 2021. - Present*
- Principle Data Scientist *Dec. 2019. - Mar. 2021*
 - Wireless AI for wireless sensing and localization using ambient radio signals ([see 🖱](#))

PUBLICATIONS

- [J1] **X. Zeng**, M. Yang, B. Chen and Y. Jin, "Estimation of Direction of Arrival by Time Reversal for Low-Angle Targets," in *IEEE Transactions on Aerospace and Electronic Systems (IEEE TAES)*, vol. 54, no. 6, pp. 2675-2694, Dec. 2018. (**JCR: Q1, IF: 3.672**)
- [J2] **X. Zeng**, F. Zhang, B. Wang and K. J. R. Liu, "Radio Frequency Based Direction Sensing Using Massive MIMO," in *IEEE Access*, vol. 8, pp. 26827-26838, Jan. 2020. (**JCR: Q1, IF: 3.745**)
- [J3] **X. Zeng**, F. Zhang, B. Wang and K. J. R. Liu, "Massive MIMO for High-Accuracy Target Localization and Tracking," in *IEEE Internet of Things Journal (IEEE IoTJ)*, Jan. 2021 (Early Access). (**JCR: Q1, IF: 9.936**)
- [J4] F. Wang, **X. Zeng**, C. Wu, B. Wang, and K. J. Ray Liu, "mmHRV: Contactless Heart Rate Variability Monitoring using Millimeter-Wave Radio," *IEEE Internet of Things Journal (IEEE IoTJ)*, Feb. 2021 (Accepted, to appear). (**JCR: Q1, IF: 9.936**)
- [C1] **X. Zeng**, F. Zhang, B. Wang and K. J. Ray Liu, "High Accuracy Tracking of Targets Using Massive MIMO," 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Toronto Canada, Jun. 2021 (Accepted, to appear).

- [C2] F. Wang, **X. Zeng**, C. Wu, B. Wang and K. J. Ray Liu, "Radio Frequency Based Heart Rate Variability Monitoring," 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Toronto Canada, Jun. 2021 (Accepted, to appear).
- [C3] **X. Zeng**, B. Wang and K. J. Ray Liu, "Driver Arrival Sensing for Smart Car using WiFi Fine Time Measurements," 2020 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC), Auckland, New Zealand, Dec. 2020.
- [C4] **X. Zeng**, B. Chen and M. Yang, "DOA estimation for low angle targets using time reversal in frequency domain model," 2018 IEEE Radar Conference (RadarConf18), Oklahoma City, OK, Apr. 2018.
- [C5] **X. Zeng**, M. Yang, B. Chen and Y. Jin, "Low angle direction of arrival estimation by time reversal," 2017 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), New Orleans, LA, Mar. 2017.
- [C6] **X. Zeng**, B. Chen, Y. Zhao and M. Yang, "Design and implementation of a T/R module automatic test system," 2016 CIE International Conference on Radar (RADAR), Guangzhou, Oct. 2016.

PATENTS

- [P1] "Method, apparatus, and system for outdoor target tracking," (US Patent No.: 16790627).
- [P2] "Method, Apparatus, and System for Wireless Gait Recognition," (Europe Patent No.:3695783).
- [P3] "Time Reversal Based DOA Estimation," (China Patent No.: ZL201610702654.8 [P]).
- [P4] "DOA Estimation by Using Nested Minimum-redundancy Arrays," (China Patent No.: ZL201510725142.9 [P]).
- [P5] "Sub-nested Minimum-redundancy Arrays for DOA estimation," (China Patent No.: ZL201610236372.3 [P]).
- [P6] "Design and implementation of a T/R module automatic test system," (China Patent No.: ZL201510566320.8 [P]).

SELECTED HONORS AND AWARDS

Four times of 1st-Class Ph.D. Student Scholarship at Xidian University,	2015-2019
Chinese Scholarship Council for Joint Ph.D students	2017-2019
Outstanding Doctoral Candidate, Xidian University (1/37)	2015-2016

PROJECTS

Time Reversal Based DOA Estimations for Low-angle Targets

- An accurate DOA Estimation for low-angle targets with serious multipath distortions based on [Time Reversal](#) theory, which turns the detrimental multipath from enemy to friend and thus improves the accuracy. [J1] [C4] [C5] [P3]

mmWave and 5G Massive MIMO for Localization and Tracking

- An accurate Localization and Tracking System based on [Time Reversal](#) and Massive MIMO techniques, which smartly leverages the unavoidable multipath distortions and thus improving the scalability. [J2] [J3] [P1].

mmWave-Based Vital Signs Monitoring

- An accurate Millimeter Wave (mmWave) based Vital Sign Monitoring System by using off-the-shelf [mmWave Radar](#), which has been implemented and invited to demo for Qualcomm. Commercial version is coming soon... [J4] [C2].

Joint Signal Decompositions over Multiple Channels

- An accurate singal decomposition method which can extract the intrinsic signal components over multiple channels simultaneously without need of the prior information about the number of the signal components.

DNN Based DOA Estimations

- Design a DNN model based on TensorFlow to learn the feature of background perturbations and thus make the system work robustly in both static and dynamic environments.

RF-based Indoor Tracking System

- Two calibration-free Indoor Tracking Systems with decimeter-accuracy by exploring the statistical properties of the received signals, which facilitates three ongoing products including Cart-tracking in supermarkets, Fall-detector and Gait-recognition with partly invited for demo to Apple, HP, Qualcomm, Verizon, Marvell [P2].

Wireless Driver Arrival Sensing for Smart Car

- An accurate driver's arrival time sensing using WiFi-FTM (IEEE 802.11mc, 2016), which makes the car more smart in multiple-service management than the existing driver's presence sensing only system. [C3].

Wireless Vital Signs Detection System

- An device-free Sleep Monitoring System for Remote Patient Monitoring using commercial WiFi devices, which won the CES 2021 Best of Innovation Award.


Device-free Wireless Monitoring System

- A highly accurate and calibration-free wireless motion detector with large through-the-wall coverage by using Channel Station Information (CSI) related techniques, which won the CES 2020 Innovation Award.

TECHNIQUES

Languages Matlab, Python, G-LabView, Linux/Unix Shell (beginner)

Technologies Machine/Deep Learning, Signal Processing, Wireless AI, Radar, mmWave, 5G, Massive MIMO

(Last updated: Feb. 17, 2021.  [More here](#))