

EDUCATION

- University of California, Los Angeles (UCLA)** Los Angeles, US
Ph.D. in Electrical and Computer Engineering, Advisor: Mani B. Srivastava 2020–2023
M.S. in Electrical and Computer Engineering, Signal and System Area, GPA: 3.90/4.00 2018–2020
- Thesis: “Towards Robust and Secure Audio Sensing Using Wireless Vibrometry and Deep Learning”
 - Courses: Deep Learning and Neural Network, Large Scale Data Mining, Wireless Communication System, Web and Mobile System, Digital Speech Processing
- Fudan University** Shanghai, China
B.Eng. in Electronics and Information Science and Technology 2014–2018
- Thesis: “Signal AoA Estimation and Human Fall Detection Using Wi-Fi Channel State Information”
 - Courses: Signal and Communication System, Digital Signal Processing, Analog and Digital Circuits, Programmable Logic Device and Hardware Description Language, Computer Architecture
- Minor in Data Science 2016–2018
- Courses: Database Systems, Machine Learning, Data Structure and Algorithms, Distributed Systems

EXPERIENCE

- Samsung Research America** Mountain View, CA
Research Intern for Knox – AI / Mobile / Privacy 2022.6–2022.9
- Designed a time-synchronized multi-sensor data collection platform for non-contact vital signal sensing
 - Created a multi-person dataset of UWB radar-measured human respiration and heartbeat along with ground truth
 - Investigating an approach combining signal processing and deep learning to compensate for handheld radar motion

PROJECTS

- Towards Real-time Rich Semantic Labeling Using Multimodal Sensor Information Fusion**
- Tech Stack: C/C++, Python, MATLAB, ROS, Scikit-learn
 - Implemented a multimodal sensing system combining LiDAR, camera, and UWB radar
 - Designed a pipeline to label the type, location, and vibration states of the objects in the environment
 - Organized device drivers, processing algorithms, and information flow into ROS nodes and topics
 - Reduced UWB radar processing algorithm complexity significantly using information from the sensors
- On-hand Tapping Recognition for Smartwatch Interactions**
- Tech Stack: Python, PyTorch, Deep Learning Domain Adaptation
 - Implemented a system using smartwatch IMU data to recognize the user’s tapping on hand knuckles as an extended smartwatch interaction interface
 - Designed a backbone convolutional neural network for accurate tapping recognition
 - Improved the robustness of the model with domain adversarial training to battle user diversities
- Audio Vibration Sensing from Multiple Targets Using Impulse-Radio Ultra-Wideband Radar**
- Tech Stack: C/C++, MATLAB, PCB Design
 - Implemented an IR-UWB radar system that can isolate target sounds from a noisy background

- Derived a theoretical analysis on performing audio sensing using impulse-based wireless signals
- Modified the driver code to re-purpose a XeThru X4M05 radar to sense audio-related vibrations
- Built a statistical signal processing pipeline to locate sound events and separate multiple sound sources

Audio Spoofing Detection Using Deep Neural Networks

- Tech Stack: Python, MATLAB, PyTorch, Speech Processing
- Assembled three deep residual neural network classifier models to protect speech recognition systems from computer-generated fake audios
- Crafted three spectrogram and cepstral coefficients-based features to capture the speech dynamics
- Achieved 25% –75% performance improvement compared to the baseline algorithms

PUBLICATIONS

- [1] Z. Gu, T. He, **Z. Wang**, and Y. Xu, “Device-free human activity recognition based on dual-channel transformer using wifi signals”, *Wireless Communications and Mobile Computing*, vol. 2022,
- [2] W. Chen, **Z. Wang**, P. Quan, Z. Peng, S. Lin, M. Srivastava, and J. Stankovic, “Making vibration-based on-body interaction robust”, in *Proceedings of the 13th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS, co-located with CPS-IoT Week 2022)*, May 2022.
- [3] S. S. Saha, S. Sandha, S. Pei, V. Jain, **Z. Wang**, Y. Li, A. Sarker, and M. Srivastava, “Auritus: An open-source optimization toolkit for training and development of human movement models and filters using earables”, *Proceedings of the ACM on Interactive Mobile Wearable and Ubiquitous Technologies*, vol. 6, p. 34, Jun. 2022.
- [4] **Z. Wang**, A. Sarker, J. Wu, D. Hua, G. Dong, A. D. Singh, and M. Srivastava, “Capricorn: Towards real-time rich scene analysis using rf-vision sensor fusion”, *Accepted by the 20th ACM Conference on Embedded Networked Sensor Systems (SenSys)*, 2022.
- [5] **Z. Wang**, B. Wang, and M. Srivastava, “Protecting user data privacy with adversarial perturbations”, in *Proceedings of the 20th International Conference on Information Processing in Sensor Networks (IPSN, co-located with CPS-IoT Week 2021)*, 2021, pp. 386–387.
- [6] **Z. Wang**, Z. Chen, A. D. Singh, L. Garcia, J. Luo, and M. Srivastava, “UWHear: Through-wall Extraction and Separation of Audio Vibrations Using Wireless Signals”, in *Proceedings of the 18th ACM Conference on Embedded Networked Sensor Systems (SenSys)*, ACM, 2020, pp. 1–14.
- [7] M. Alzantot, **Z. Wang**, and M. B. Srivastava, “Deep Residual Neural Networks for Audio Spoofing Detection”, in *Proceedings of the 20th Annual Conference of the International Speech Communication Association (INTERSPEECH)*, 2019, pp. 1078–1082.
- [8] R. Liu, **Z. Wang**, L. Garcia, and M. Srivastava, “Remediot: Remedial actions for internet-of-things conflicts”, in *Proceedings of the 6th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys)*, ACM, 2019, pp. 101–110.
- [9] **Z. Wang**, Z. Gu, J. Yin, Z. Chen, and Y. Xu, “Syncope detection in toilet environments using wi-fi channel state information”, in *Proceedings of the 2018 ACM International Joint Conference and 2018 International Symposium on Pervasive and Ubiquitous Computing and Wearable Computers (Ubicomp)*, ACM, 2018, pp. 287–290.

SKILLS

Programming Languages: Python, MATLAB, C/C++, Assembly, VHDL

Tools: Git, PyTorch, TensorFlow, ROS

SCHOLARSHIPS AND AWARDS

- | | |
|---|------------------|
| - Best Poster Honorable Mention Award, UCLA ECE Annual Research Review | 2019 |
| - Outstanding Graduates in Shanghai (Top 5% in the EE Department) | 2018 |
| - First-class scholarship for outstanding students in Fudan University | 2016, 2017, 2018 |
| - The Second Prize in National Undergraduate Electronic Design Contest, Shanghai Area | 2017 |