Jiale Zhang

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RESEARCH INTEREST

My research interest focuses on building novel multimodal sensing systems with explainable machine/deep learning models and embedded systems, enhancing the experiences of human-computer interaction.

EDUCATION

University of Michigan, Ann Arbor, Department of Electrical and Computer Engineering
Ph.D. in Electrical and Computer Engineering, **Major GPA: 3.9/4.0**　　　　　　　*Jan 2023 – Present*
M.S. in Electrical and Computer Engineering, **Major GPA: 3.9/4.0**　　　　　　　*Sep 2020 – Dec 2022*

ShanghaiTech University (SHTU), School of Information Science and Technology (SIST)
B.E. in Electronic Information Engineering, **Major GPA: 3.9/4.0**　　　　　　　*Aug 2016 – Jul 2020*

Honors and Awards:
- Qualcomm Innovation Fellowship 2023-2024
- Rackham International Student Fellowship 2021-2022
- First Prize in the Second Shanghai Maker Contest (**1 out of 300**)

Teaching:
- Graduate Student Instructor of *EECS215: Introduction to Circuit Basics* in FALL 2024
- Graduate Student Instructor of *EECS507: Introduction to Embedded Systems Research* in FALL 2022

PUBLICATIONS

- ***(Best Paper Runner-Up)*** Codling, J. R., Shulkin, J. D., Chang, Y. C., Zhang, J., Latapie, H., Noh, H. Y., & Dong, Y. (2024, October). FloHR: Ubiquitous Heart Rate Measurement using Indirect Floor Vibration Sensing. In *Proceedings of the 11th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation* (pp. 44-54).
- Zhang, Jiale, et al. "Vibration-Based Object Classification with Structural Response of Ambient Music." *Proceedings of the 22nd International Conference on Information Processing in Sensor Networks*. 2023.
- J. Zhang, C. Li, W. Jiang, Z. Wang, L. Zhang and X. Wang, "Deep-learning-enabled Microwave-induced Thermoacoustic Tomography based on Sparse Data for Breast Cancer Detection," in *IEEE Transactions on Antennas and Propagation*.
- Jiale Zhang, "Directly Controlling the Perceived Difficulty of a Shooting Game by the Addition of Fake Enemy Bullets", CHI EA '21: Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems

RESEARCH EXPERIENCE

Weight Change Estimation Through Audio-Induced Shelf Vibrations in Autonomous Stores　　Ann Arbor, MI
Advisor: Prof. Pei Zhang, University of Michigan　　　　　　　　　　　　　　*Feb 2023 – Present*
- We propose the first system that utilizes audio-induced vibrations from a speaker to detect weight changes on the shelf during shopping using one vibration sensor at best.
- We model a structure-dynamics-informed relationship between the shelf vibration response and item weight across multiple locations on the shelf, improving the data efficiency.
- We validate our system in a real-world shopping layout with the best error at 41g.

Privacy-Aware Activity Localization and Recognition Using Ultrasound Microphone Array　　Ann Arbor, MI
Advisor: Prof. Alanson Sample, University of Michigan　　　　　　　　　　　*Feb 2021 – Present*
- Developed a sound/ultrasound tracking system based on self-designed 49-mic array on FPGA board with configurable sampling frequencies up to 192kHz.
- Prototyped a sound/ultrasound tracking system that can track at most 5 sources simultaneously.
- 45% average improvement is achieved on multi-acoustic event recognition by fusing the location in the system.

Deep-learning-Enabled Thermoacoustic Tomography based on Sparse Data　　　　　　　Shanghai
Advisor: Prof. Xiong Wang, ShanghaiTech University　　　　　　　　　　　*Feb 2021 – Jun 2021*
- Proposed a new DL-based microwave-induced thermoacoustic tomography modality to address the sparse data reconstruction and applies it in breast cancer detection.
- By combining the FPNet and UNet, we successfully reconstructed the breast tumor by only using 25% transducers covering 30 degrees.

SKILLS

Programming Language: Python, C/C++, C#, Verilog/System Verilog/VHDL, MATLAB
Development Kit: PyTorch, Quartus, Vitis, ESP32, STM32, Labview, Fusion360