

Yongjie Yang

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124 Villa Drive, Pittsburgh, PA 15214

Research Interests

Earable Headset Software and Hardware Design; Acoustic Sensing; Multi-modal Interfaces for Human-Computer Interaction; Machine Learning; Audio Processing.

Skills

Circuit Design; PCB Design; Signal Processing; Programming Languages (MATLAB, Python)

Education

University of Pittsburgh - Pittsburgh, PA

Ph.D. in Computer Science. (Advisor: Prof. *Longfei Shangguan*)

Expected Graduation: Winter, 2026

Boston University - Boston, MA

M.S. in Electrical and Electronics Engineering.

University of Massachusetts, Amherst - Amherst, MA

B.S. in Electrical and Electronics Engineering.

Selected Ongoing Research Projects

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|------------|---|-----------------------------------|
| I. | 4D Gesture Reconstruction Using Earphones | <i>April 2024 – November 2024</i> |
| | <ul style="list-style-type: none">Developed a groundbreaking 4D gesture recognition system leveraging acoustic signals from an Earable device, enabling hand tracking without the need for external cameras or motion sensors.Innovatively fused Frequency Modulated Continuous Wave (FMCW) acoustic signals with 3D joint data from Leap Motion, capturing subtle hand gestures and predicting the trajectories of 23 hand joints.Introduced a novel Transformer-based model with cross-attention mechanisms to effectively merge multi-modal data streams, ensuring accurate gesture reconstruction across varying motion speeds and hand poses.Integrated an advanced Inverse Kinematics (IK) constraint layer to maintain realistic hand motion by preserving the anatomical structure of hand joints, achieving state-of-the-art accuracy in gesture-based control systems. | |
| II. | HeadFi II: Resilient Earable Computing Platform with Onboard Learning | <i>December 2022 – Present</i> |
| | <ul style="list-style-type: none">Developed HeadFi II, a cutting-edge Earable platform that enables real-time physiological sensing and user interaction through dual acoustic channels, while preserving high-quality music playback.Designed the platform with low power consumption and cost-efficiency, making it highly suitable for large-scale deployment in underdeveloped areas, providing accessible technological solutions for applications.Demonstrated versatility in a range of use cases, from gesture-based control to health monitoring, showcasing the platform's potential for widespread adoption in low-resource settings.Currently working on implementing onboard machine learning capabilities to allow the system to dynamically adapt sensing algorithms based on user behavior and environmental changes, aiming to enhance both accuracy and user experience. | |

Publication and Patent

- [1] Tao Chen, **Yongjie Yang**, Xiaoran Fan, Xiuzhen Guo, Jie Xiong, Longfei Shangguan, “Exploring the Feasibility of Remote Cardiac Auscultation Using Earphones,” *MobiCom 2024*. **Best Paper Award!**
- [2] **Yongjie Yang**, Tao Chen, Longfei Shangguan, “Towards Next-Generation Human Computer Interface Based On Earables,” *IEEE Pervasive Computing*, 2024.
- [3] **Yongjie Yang**, Tao Chen, Yujing Huang, Xiuzhen Guo, Longfei Shangguan, “MAF: Exploring Mobile Acoustic Field for Hand-to-Face Gesture Interactions,” *CHI 2024*.
- [4] Tao Chen, **Yongjie Yang**, Chonghao Qiu, Xiaoran Fan, Xiuzhen Guo, Longfei Shangguan, “Enabling Hands-Free Voice Assistant Activation on Earphones,” *MobiSys 2024*.
- [5] Xueteng Qian, Xiuzhen Guo, **Yongjie Yang**, Xiaoran Fan, Longfei Shangguan, “HeadFi II: Toward More Resilient Earable Computing Platform,” *Poster, SenSys 2022*.
- [6] Tao Chen, Xiaoran Fan, **Yongjie Yang**, Longfei Shangguan, “Towards Remote Auscultation with Commodity Earphones,” *Poster, SenSys 2022*.

Awards

- Student Travel Grant – MobiSys, 2024, Japan
- Best Paper Award – MobiCom, 2024, Washington, DC
- Student Fellowship – School of Computing and Information, 2025, Pittsburgh