HAO ZHOU

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RESEARCH OVERVIEW

My research sits at the intersection of **mobile and wearable computing, cyber-physical systems, internet-of-things, human-computer interaction, and deep learning**. I build AI-powered mobile systems that seamlessly monitor human behavior and physiology, enabling applications in motion analytics, mobile health, and accessibility.

EDUCATION

The Pennsylvania State University — State College, PA, USA
Doctor of Philosophy in Computer Science and Engineering — *2021 - 2026 May (Expected)*
Advisor: Dr. Mahanth Gowda

The University of Mississippi — Oxford, MS, USA
Master of Science in Computer Science — *2019 - 2021*
Bachelor of Science in Computer Science — *2016 - 2019*

SELECTED PUBLICATIONS

[Under Review] **Hao Zhou** and Mahanth Gowda. *"Exploring the Feasibility of Full-Body Muscle Activation Sensing with Insole Pressure Sensors."*

[Under Review] **Hao Zhou**, and Collaborators at Samsung Research America. *"Continuous Health Monitoring and Reasoning with Large-scale PPG."*

[Under Review] **Hao Zhou**, and Collaborators at Samsung Research America. *"A Personalized Real-time Proactive Voice Memory Assistant."*

[MobiSys 25] Rising Star Forum **Hao Zhou**. *"Rethinking Inexpensive Wearables in the Era of AI: From Motion Analytics to Mobile Health."*

[ICASSP 25] **Hao Zhou**, Md Mahbubur Rahman, Mehrab Bin Morshed, Yunzhi Li, Md Saiful Islam, Larry Zhang, Jungmok Bae, Christina Rosa, Wendy Berry Mendes, and Jilong Kuang. *"Know Your Heart Better: Multimodal Cardiac Output Monitoring Using Earbuds."*

[UbiComp 25] Kuang Yuan, Dong Li, **Hao Zhou**, Zhehao Li, Lili Qiu, Swarun Kumar, and Jie Xiong. *"WindDancer: Understanding Acoustic Sensing under Ambient Airflow."*

[UIST 25] Yongxiang Cai, Taiting Lu, Zhenghao Li, **Hao Zhou**, Kenneth DeHaan, Xuhai Xu, Mahanth Gowda, and Yincheng Jin. *"SignGlass: First-Person View Comprehensive and Generalizable ASL Translation Using Wearable Glasses."*

[CHI 25] Md Saiful Islam, Md Mahbubur Rahman, Mehrab Bin Morshed, David J. Lin, Yunzhi Li, **Hao Zhou**, Wendy Berry Mendes, and Jilong Kuang. *"BallistoBud: Heart Rate Variability Monitoring Using Earbud Accelerometry for Stress Assessment."*

[**ICCV 25**] Yusen Zhang, Wenliang Zheng, Aashrith Madasu, Peng Shi, Ryo Kamoi, **Hao Zhou**, Zhuoyang Zou, Shu Zhao, Sarkar Snigdha Sarathi Das, Vipul Gupta, Xiaoxin Lu, Nan Zhang, Ranran Haoran Zhang, Avitej Iyer, Renze Lou, Wenpeng Yin, and Rui Zhang. *"HRScene: How Far Are VLMs from Effective High-Resolution Image Understanding?."*

[**ICASSP 25**] Yunzhi Li, Md Mahbubur Rahman, Mehrab Bin Morshed, Md Saiful Islam, **Hao Zhou**, Weinan Wang, Holland Ernst, Li Zhu, and Jilong Kuang. *"Optimizing Biomarkers from Earbud Ballistocardiogram: Calibration and Calibration-Free Algorithms for Accelerometer Axis Selection and Fusion."*

[**EMBC 25**] Larry Zhang, Md Mahbubur Rahman, Mehrab Bin Morshed, Li Zhu, **Hao Zhou**, Julia O'Bryan, Wendy Berry Mendes, and Jilong Kuang. *"Feasibility of Cardiac Output Estimation Using Earbud Photoplethysmography Sensor."*

[**MobiCom 24**] **Hao Zhou**, Kuang Yuan, Mahanth Gowda, Lili Qiu, and Jie Xiong. *"Rethinking Orientation Estimation with Smartphone-Equipped Ultra-Wideband Chips."*

[**IoTDI 24**] **Hao Zhou**, Taiting Lu, Kenneth DeHaan, and Mahanth Gowda. *"ASLRing: American Sign Language Recognition with Meta-Learning on Wearables."*

[**UbiComp 24**] Runze Liu, Taiting Lu, Shengming Yuan, **Hao Zhou**, and Mahanth Gowda. *"SmartDampener: An Open Source Platform for Sport Analytics in Tennis."*

[**MobiCom 23**] **Hao Zhou**, Taiting Lu, Kristina Mckinnie, Joseph Palagano, Kenneth DeHaan, and Mahanth Gowda. *"SignQuery: A Natural User Interface and Search Engine for Sign Languages with Wearable Sensors."*

[**IoTDI 23**] **Hao Zhou**, Taiting Lu, Yilin Liu, Shijia Zhang, Runze Liu, and Mahanth Gowda. *"One Ring to Rule Them All: An Open Source SmartRing Platform for Finger Motion Analytics and Healthcare Applications."*

[**TIOT 23**] Shijia Zhang, Taiting Lu, **Hao Zhou**, Yilin Liu, Runze Liu, and Mahanth Gowda. *"I Am an Earphone and I Can Hear My User's Face: Facial Landmark Tracking Using Smart Earphones."*

[**NeurIPS 23**] Workshop Xi Li, Songhe Wang, Chen Wu, **Hao Zhou**, and Jiaqi Wang. *"Backdoor Threats from Compromised Foundation Models to Federated Learning."*

[**UbiComp 22**] **Hao Zhou**, Taiting Lu, Yilin Liu, Shijia Zhang, and Mahanth Gowda. *"Learning on the Rings: Self-Supervised 3D Finger Motion Tracking Using Wearable Sensors."*

INDUSTRIAL (RESEARCH) EXPERIENCE

Samsung Research America, hosted by Digital Health Lab 05-24 – 08-24 & 07-25 – 11-21

- Developed foundation models on large-scale PPG and ECG data to understand various downstream tasks, including blood pressure, cardiovascular conditions, and sleep stages.
- Developed an end-to-end memory aid on Samsung earbuds, serving people with potential memory loss.

- Developed multimodal health monitoring systems for digital biomarkers (e.g., cardiac output, stress levels, heart rate variability) with Samsung devices.

Microsoft Research Asia (Shanghai) 05-23 – 08-23

- Leveraged ultra-wideband (UWB) technology in consumer-grade electronics for device orientation estimation and respiration monitoring.