

HAO ZHOU

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RESEARCH INTERESTS

Internet of Things, Wireless Sensing, Wearable Computing, and Multimodal Learning

EDUCATION

The Pennsylvania State University

State College, PA, USA

Doctor of Philosophy in Computer Science and Engineering

2021 - Present

The University of Mississippi

Oxford, MS, USA

Master of Science in Computer Science

2019 - 2021

Bachelor of Science in Computer Science

2016 - 2019

HONORS & AWARDS

International Student Travel Grant

The Pennsylvania State University, 2023

Student Travel Grant

ACM MobiCom, 2023

Best Paper Award for Edge IoT AI

ACM/IEEE IoTDI, 2023

Outstanding Teaching Assistant Award

The Pennsylvania State University, 2022

Best Paper Award

IEEE SBAC-PAD 2021, 2021

Summa Cum Laude

University of Mississippi, 2019

International Undergraduate Student Scholarship

University of Mississippi, 2017 - 2019

PUBLICATIONS

[C.4] SignQuery: A Natural User Interface and Search Engine for Sign Language with Wearable Sensors

Hao Zhou, Taiting Lu, Kristina McKinnie, Joseph Palagano, Kenneth DeHaan, Mahanth Gowda

ACM MobiCom, 2023

[C.3] One Ring to Rule Them All: An Open Source Smartring Platform for Finger Motion Analytics and Healthcare Applications

Hao Zhou, Taiting Lu, Yilin Liu, Shijia Zhang, Runze Liu, Mahanth Gowda

ACM/IEEE IoTDI, 2023, (**Best Paper Award for Edge IoT AI**)

[J.2] I am an Earphone and I can Hear my Users Face: 3D Facial Reconstruction using Smart Earphones

Shijia Zhang, Taiting Lu, **Hao Zhou**, Yilin Liu, Runze Liu, Mahanth Gowda

ACM Transactions on Internet of Things, 2023

[W.1] Backdoor Threats from Compromised Foundation Models to Federated Learning

Xi Li, Songhe Wang, Chen Wu, **Hao Zhou**, Jiaqi Wang

FL@FM-NeurIPS'23

[J.1] Learning on the Rings: Self-Supervised 3D Finger Motion Tracking using Wearable Sensors

Hao Zhou, Taiting Lu, Yilin Liu, Shijia Zhang, Mahanth Gowda

ACM IMWUT/UbiComp 2022

[C.2] DACHash: A Dynamic, Cache-Aware and Concurrent Hash Table on GPUs

Hao Zhou, David Troendle, Byunghyun Jang

IEEE SBAC-PAD 2021, (**Best Paper Award**)

[C.1] Exploring Faster RCNN for Fabric Defect Detection
Hao Zhou, Byunghyun Jang, Yixin Chen, David Troendle
IEEE AI4I 2020

INTERNSHIPS

Microsoft Research Asia

May 2023 - Aug 2023, Shanghai, China

Mentor: Dr. Jie Xiong

- Ultra-wideband (UWB) Sensing on Consumer-level Devices
- Exploring Intersection of 3D Vision and Wireless Sensing

RESEARCH EXPERIENCE

Graduate Research Assistant,

The Pennsylvania State University

Advisor: Dr. Mahanth Gowda

September 2021 - Present

State College, PA, USA

- Sign Language Search Engines with Wearables
 - ⇒ Propose a system, *SignQuery*, to capture queries (signs in form of IMU signals) by Deaf users, and retrieve relevant documents from an online sign video database with diverse topics.
 - ⇒ Accessibility is greatly improved for Deaf users by having them search as hearing people on search engines such as Google, Bing, and Baidu.
- 3D Facial Expression Tracking with Smart Earphones
 - ⇒ Propose a system, *EarFace*, to continuously track facial expressions with acoustic signals.
 - ⇒ Leverage *FLAME* to render a realistic 3D face from 2D landmarks.
- Finger Motion Analytics and Healthcare Application using Smartrings
 - ⇒ Propose a system, *OmniRing*, to analyze finger motion and monitor health conditions.
 - ⇒ Harvest virtual IMU data from online videos to reduce the training overhead from the effort of collecting real IMU data; Inter-finger relation is learned based on the use of Transformer architectures to reduce the number of rings required.
 - ⇒ PPG sensor is incorporated for estimating health conditions such as heart rates.
- Finger Motion Tracking Aided by Self-supervised Learning
 - ⇒ Propose a system, *ssLOTR* that leverages the anatomical constraints of finger motions and deep learning modules to track 3D finger motion.
 - ⇒ Design a contrastive learning framework along with data augmentation techniques to learn better representations for IMU signals, by which only 15% labeled IMU data is necessary to achieve similar accuracy with its supervised counterpart.
 - ⇒ Conduct a systematic user study to demonstrate *ssLOTR* is robust to environments, sensor positions, etc., enabling a number of applications in augmented and virtual reality, sign language recognition, rehabilitation healthcare, sports analytic, etc., with the promise of ubiquitous finger motion tracking.

Graduate Research Assistant,

The University of Mississippi

Advisor: Dr. Byunghyun Jang

September 2019 - May 2021

Oxford, MS, USA

- Develop a Concurrent Data Structure (Hash Table) on GPU
 - ⇒ Optimize hash table performance by considering memory access pattern and thread divergence.
 - ⇒ Utilize warp synchronization to minimize thread divergence.
 - ⇒ Leverage fast cache for data re-usage.
- Optimized Faster RCNN for Fabric Defect Detection
 - ⇒ Studied how Faster RCNN works as a two-stage object detector.
 - ⇒ Analyzed performance of Faster RCNN on fabric images.

TEACHING EXPERIENCE

Graduate Teaching Assistant

The Pennsylvania State University

State College, PA, USA

CMPEN 462: Wireless Communication Systems and Security, Spring 2022

- Helped students understand the concepts in linear algebra, wireless communications, and state-of-the-art systems in wireless sensing, mobile computing, etc.
- Assisted students in a distance estimation project where acoustics signals are leveraged.

PROFESSIONAL SERVICE

Invited Reviewer for IMWUT

2023

Invited Reviewer for Journal of Intelligent Manufacturing

2022

Student Volunteer @ MobiQuitous '22

2022