HAO ZHOU

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RESEARCH INTERESTS

Mobile and Wearable Computing, Transfer Learning, GPGPU

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*

North China University of Technology — Beijing, China
Bachelor of Science in Computer Science — *2014 - 2016*

HONORS & AWARDS

Outstanding TA Award, The Pennsylvania State University	2022
Best Paper Award, SBAC-PAD 2021	2021
Summa Cum Laude, University of Mississippi (UM)	2019
International Undergraduate Student Scholarship, UM	2017 - 2019
National Scholarship for Exchange Student	2016
National Scholarship, Ministry of Education of the People's Republic of China	2015
Outstanding Freshmen, North China University of Technology	2014

PUBLICATIONS

[C.4] 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
IEEE/ACM IoTDI, 2023

[J.2] 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

[J.1] 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 (Under Review)

[C.3] 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.2] One-Class Model for Fabric Defect Detection
Hao Zhou, Yixin Chen, David Troendle, Byunghyun Jang
MLTEC 2021

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

RESEARCH EXPERIENCE

Graduate Research Assistant, *September 2021 - Present*
The Pennsylvania State University State College, PA, USA
Advisor: Dr. Mahanth Gowda

- 3D Facial Expression Tracking with Smart Earphones
  - Propose a system, *EarFace*, to continuously track facial expressions with acoustics.
  - 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, *September 2019 - May 2021*
The University of Mississippi Oxford, MS, USA
Advisor: Dr. Byunghyun Jang

- 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.
- One class model for solving fabric defect detection
  - Utilize Gabor filters
  - Leverage Variational Autoencoder to reduce the dimension of Gabor features.
  - Neareast Neighbor density estimation for detection.
- Optimized Faster Region-Based Convolutional Neural Network(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.

Undergraduate Research Assistant, *September 2017 - September 2018*
The University of Mississippi Oxford, MS, USA
Advisor: Dr. H. Conrad Cunningham

- Develop a tool that extends the Markdown source format to enable the specification of more accessible interactive and multimedia features. This work potentially enhances the ability of authors and publishers to produce broadly accessible documents.

WORK 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.

Undergraduate Teaching Assistant *September 2018 - September 2019*
The University of Mississippi Oxford, MS, USA

- Tutored students taking computer science courses (e.g., Java, C/C++, and Data Structure) in their assignments and projects
- Assisted instructor in grading students' programming assignments for Organization of Programming Languages

PROFESSIONAL SERVICE

Invited Reviewer for IMWUT	2023
Invited Reviewer for Journal of Intelligent Manufacturing	2022
Student Volunteer @ MobiQuitous '22	2022