Haoyang WANG

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Research Interests

Mobile computing; Internet of Things (IoT); Distributed & embedded AI.

Education

Tsinghua University, China July 2022 - 2027(Expected)

Ph.D. Candidate in Data Science and Information Technology

- Supervisor: Prof. Xinlei Chen

Central South University, China Aug. 2018 - July 2022

*B.Eng. in Internet of Things with **Excellent Thesis & Graduation Award***

- Supervisor: Prof. Yaoxue Zhang and Prof. Ju Ren

Research Experience

Improving High-Frequency Drone Localization through Bio-Inspired Sensors Sep. 2023 – Present

Project Leader *Shenzhen, China*

- Event camera, distinguished by its asynchronous and motion-activated characteristics and microsecond-level temporal resolution, acts as a catalyst in advancing our exploration of high-frequency drone localization.
- Address practical issues in event burst and heterogeneous measurements fusion.

Optimizing Localization and Navigation for Heterogeneous MAV Swarms July 2022 – July 2023

Project Leader *Shenzhen, China*

- We propose TransformLoc, a new framework that dynamically transforms AMAVs into mobile localization infrastructures, enhancing localization accuracy and real-time performance for lightweight BMAVs.
- We design an *error-aware joint location estimation model* to boost the location estimation accuracy of BMAVs with discontinuous observation from AMAVs.
- We design a *proximity-driven adaptive grouping-scheduling strategy* to decouple the resource allocation issue given coupled influential factors.
- We validate our solution through in-field experiments on a real heterogeneous MAV swarm and large-scale physical feature-based simulations.

Output: **IEEE INFOCOM 2024**, ACM SenSys 2022 CML-IoT workshop.

Enhancing Air Pollution Sensing Calibration through Self-Supervised Learning April 2023 – June 2023

Project Leader *Shenzhen, China*

- We propose CaliFormer, which is the first attempt to incorporate self-supervised learning into sensor calibration to overcome the challenge of limited labeled data.
- Drawing inspiration from Transformer, a set of enhancements in pre-training methodology and model architecture are proposed to help train the calibration model effectively.
- Our method is compared with SOTA methods through experiments. The results demonstrate the performance of the calibration model based on CaliFormer.

Output: ACM Ubicomp 2024 CPD workshop **(Best Presentation Award)**.

Publicatinons

(∗ denotes co-primary author, and # denotes corresponding author)

Conference Papers

[C5] **Haoyang Wang**, Jingao Xu, Chenyu Zhao, Zihong Lu, Chen Cheng, Xuecheng Chen, Xiao-Ping Zhang, Yunhao Liu, Xinlei Chen#, *"TransformLoc: Transforming MAVs into Mobile Localization Infrastructures in Heterogeneous Swarms"*, IEEE Conference on Computer Communications (**IEEE INFOCOM**), 2024.

[C4] **Haoyang Wang***, Yuxuan Liu*, Chenyu Zhao, Jiayou HE, Xinlei Chen#, *"CaliFormer: Leveraging Unlabeled Measurements to Calibrate Sensors with Self-supervised Learning"*, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies CPD workshop (**ACM UbiComp CPD workshop**), 2023. (**Best Presentation Award**).

[C3] Chenyu Zhao*, **Haoyang Wang***, Jiaqi Li, Fanhang Man, Shilong Mu, Wenbo Ding, Xiao-Ping Zhang, Xinlei Chen#, *"SmoothLander: A Quadrotor Landing Control System with Smooth Trajectory Guarantee Based on Reinforcement Learning"*, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies CPD workshop (**ACM UbiComp CPD workshop**), 2023.

[C2] **Haoyang Wang***, Xuecheng Chen*, Yuhan Cheng, Chenye Wu, Fan Dang, Xinlei Chen#, *"H-SwarmLoc: Efficient Scheduling for Localization of Heterogeneous MAV Swarm with Deep Reinforcement Learning"*, ACM Conference on Embedded Networked Sensor Systems CML-IoT workshop(**ACM SenSys CML-IoT workshop**), 2022.

[C1] Xuecheng Chen, **Haoyang Wang**, Zuxin Li, Wenbo Ding, Fan Dang, Chengye Wu, Xinlei Chen#, *"DeliverSense: Efficient delivery drone scheduling for crowdsensing with deep reinforcement learning"*, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies CPD workshop (**ACM UbiComp CPD workshop**), 2022. (**Best Paper Award**).

Journal Papers

[J1] Jiawei Guo, **Haoyang Wang**, Wei Liu, Guosheng Huang, Jinsong Gui, Shaobo Zhang, *"A lightweight verifiable trust based data collection approach for sensor–cloud systems"*, Journal of Systems Architecture: Embedded Software Design (**Elsevier JSA, CCF B**), 2021.

Posters & Demos

[P3] **Haoyang Wang**, Xinyu Luo, Ciyu Ruan, Xuecheng Chen, Wenhua Ding, Yuxuan Liu, Xinlei Chen#, *"Poster: Fusing Event and Depth Sensing for Dynamic Objects Localization and Tracking"*, The International Workshop on Mobile Computing Systems and Applications (**ACM HotMobile**) 2024.

[P2] Yuhan Cheng*, Xuecheng Chen*, Yixuan Yang, **Haoyang Wang**, Yuxuan Liu, Xinlei Chen#, *"Poster: Olfactory Sensing in Turbulent Airflow via Collaborative Robots"*, The International Workshop on Mobile Computing Systems and Applications (**ACM HotMobile**) 2024.

[P1] **Haoyang Wang**, Fanhang Man, Zihan Wang, Yuxuan Liu, Xinlei Chen, Wenbo Ding#, *"Poster: TENG-enabled Self-powered Human-machine Interfaces for the Metaverse"*, The ACM/IEEE International Conference on Information Processing in Sensor Networks (**ACM/IEEE IPSN**), 2023.

Honors & Awards

2023 **1st in Low-Altitude Economy Flight Management Challenge Creative Competition**, Meituan Inc.

2023 **Best Presentation Award** (*Top 1 out of all submissions*), ACM Ubicomp 2023 CPD

2023 **Second-class Overall Excellence Scholarship**, Tsinghua University

2022 **Best Paper Award** (*Top 1 out of all submissions*), ACM Ubicomp 2022 CPD

2022 **Outstanding Thesis & Outstanding Graduate**, Central South University

2022 **Excellent Graduate**, Hunan province

2019 **National Scholarship**, China

2019 **Finalist of National College Students Intelligent Design Competition** *(Top 5 out of all teams)*, CAAI

2019 **First Prize of China Robot Competition Advanced Vision Competition** *(Top 1 out of all teams)*, CAA

Professional Experience

Teaching

2023 **Teaching Assist**: Introduction to AIoT; Fall 2023, Tsinghua University

2023 **Teaching Assist**: Urban low altitude messenger; Spring 2024, Tsinghua University and Meituan Inc.