

Haoyang WANG

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Research Focus

My research vision is to build **embodied and embedded intelligence** that can perceive, learn, and act reliably in the physical world. I connect **bio-inspired sensing**, **multimodal learning**, and **efficient computing** to enable autonomous systems that adapt to dynamic environments and collaborate under resource constraints.

Employment

Tsinghua University, China

Aug. 2026 – Present

Assistant Researcher, Department of Automation

Advisor: [Prof. Yunhao Liu](#)

Education

Tsinghua University, China

Sept. 2022 – June 2026

Ph.D. in Data Science and Information Technology

Supervisor: [Prof. Xinlei Chen](#)

Thesis: *Key Technologies for Low-altitude Intelligent Perception with Bio-inspired Dynamic Vision* [\[PDF\]](#)

University of California, Berkeley, USA

Jan. 2025 – June 2025

Visiting PhD Scholar, Embedded Artificial Intelligence and Sensing

Host: [Prof. Liwei Lin](#)

Central South University, China

Aug. 2018 – June 2022

B.Eng. in Internet of Things Engineering

Outstanding Thesis & Outstanding Graduate

Selected Research Contributions

EV-Pose: Perception at the pace of action

First author | IEEE TMC 2026

Bridges sensing and control timescales through event-driven, high-frequency spatial perception.

[\[J.10\]](#) [\[Project\]](#)

mmE-Loc: Complementary sensing for autonomy

First author | SenSys 2025 / TMC 2026

Combines event vision and radar for complementary, resilient spatial awareness.

[\[C.04\]](#) [\[J.07\]](#) [\[Project\]](#)

x^2 -Fusion: A shared language for motion

Co-first author | CVPR 2026 Highlight

Unifies cross-modal motion estimation in a shared geometric edge space.

[\[C.06\]](#)

Event cameras: Rethinking embodied perception

First author | ACM CSUR 2026

Connects event-based sensing, learning, and efficient computing for embodied perception.

[\[J.06\]](#) [\[Resources\]](#)

TransformLoc: Localization as a shared resource

First author | INFOCOM 2024 / TMC 2025

Turns individual localization capabilities into a shared resource for robot teams.

[\[C.01\]](#) [\[J.05\]](#)

Full Publications

* Equal contribution / co-first authors; # Corresponding authors. [Google Scholar](#)

Main Conference Papers

[C.09] Wenhua Ding, Chi Liu, Shihan Peng, **Haoyang Wang**, Shilong Ji, Zhengli Zhang, Yude Li, Jingao Xu, Yunhao Liu, Xinlei Chen. *When RGB goes blind: Robust Depth Estimation via Event-LiDAR Fusion*. ACM/IEEE International Conference on Embedded Artificial Intelligence and Sensing Systems (**ACM/IEEE SenSys**), 2027 (accepted).

- [C.08] Pengtao Ma*, Ziliang Zhou*, Ciyu Ruan, **Haoyang Wang**, Kaiyuan Li, Zihang Gong, Wenhua Ding, Chen Gao, Jingao Xu, Xinlei Chen. *EventPrune: Cascaded Event-Assisted Token Pruning for Efficient First-Person Dynamic Spatial Reasoning*. Advances in Neural Information Processing Systems (**NeurIPS**), 2026 (accepted). [\[Paper\]](#)
- [C.07] Baining Zhao*, Jiacheng Xu*, Weicheng Feng*, Xin Zhang*, Zhaolu Wang*, **Haoyang Wang**, Shilong Ji, Ziyong Wang, Jianjie Fang, Zhiheng Zheng, Weichen Zhang, Yu Shang, Wei Wu, Chen Gao[#], Xinlei Chen[#], Yong Li. *WorldVLN: Autoregressive World Action Model for Aerial Vision-Language Navigation*. Advances in Neural Information Processing Systems (**NeurIPS**), 2026 (accepted). [\[Paper\]](#) [\[Project\]](#)
- [C.06] Ruishan Guo*, Ciyu Ruan*, **Haoyang Wang***, Zihang Gong, Jingao Xu, Xinlei Chen[#]. *x²-Fusion: Cross-Modality and Cross-Dimension Flow Estimation in Event Edge Space*. IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**), 2026. **Highlight**. [\[Paper\]](#)
- [C.05] Xuecheng Chen*, Jingao Xu*, Wenhua Ding, **Haoyang Wang**, Xinyu Luo, Ruiyang Duan, Jialong Chen, Xueqian Wang, Yunhao Liu, Xinlei Chen[#]. *Count Every Rotation and Every Rotation Counts: Exploring Drone Dynamics via Propeller Sensing*. ACM/IEEE International Conference on Embedded Artificial Intelligence and Sensing Systems (**ACM/IEEE SenSys**), 2026. [\[Paper\]](#) [\[Project\]](#)
- [C.04] **Haoyang Wang**, Jingao Xu, Xinyu Luo, Xuecheng Chen, Ting Zhang, Ruiyang Duan, Yunhao Liu, Xinlei Chen[#]. *Ultra-High-Frequency Harmony: mmWave Radar and Event Camera Orchestrate Accurate Drone Landing*. ACM Conference on Embedded Networked Sensor Systems (**ACM SenSys**), 2025. [\[Paper\]](#) [\[Project\]](#)
- [C.03] Chenyu Zhao*, Ciyu Ruan*, Jingao Xu[#], **Haoyang Wang**, Shengbo Wang, Jirong Zha, Jiaqi Li, Zheng Yang, Yunhao Liu, Xiao-Ping Zhang, Xinlei Chen[#]. *Foes or Friends: Embracing Ground Effect for Edge Detection on Lightweight Drones*. ACM International Conference on Mobile Computing and Networking (**MobiCom**), 2024. [\[Paper\]](#)
- [C.02] Yuxuan Liu*, **Haoyang Wang***, Fanhang Man, Jingao Xu, Fan Dang, Yunhao Liu, Xiao-Ping Zhang, Xinlei Chen[#]. *MobiAir: Unleashing Sensor Mobility for City-scale and Fine-grained Air-Quality Monitoring with AirBERT*. ACM International Conference on Mobile Systems, Applications, and Services (**MobiSys**), 2024. [\[Paper\]](#)
- [C.01] **Haoyang Wang**, Jingao Xu, Chenyu Zhao, Zihong Lu, Yuhang 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 (**INFOCOM**), 2024. [\[Paper\]](#)

Journal Papers

- [J.10] **Haoyang Wang**, Xinyu Luo, Wenhua Ding, Jingao Xu, Xuecheng Chen, Ruiyang Duan, Jialong Chen, Chao Wang, Haitao Zhang, Yunhao Liu, Xinlei Chen[#]. *EV-Pose: Event-Camera-Enhanced High-Frequency Visual Positioning Service for Accurate Drone Landing*. IEEE Transactions on Mobile Computing (**IEEE TMC**), 2026. [\[Paper\]](#) [\[Project\]](#)
- [J.09] Chenyu Zhao*, Ciyu Ruan*, Jingao Xu, **Haoyang Wang***, Shengbo Wang, Jiaqi Li, Jirong Zha, Weijie Hong[#], Zheng Yang, Yunhao Liu, Xiao-Ping Zhang, Xinlei Chen. *Flight Dynamics to Sensing Modalities: Exploiting Drone Ground Effect for Accurate Edge Detection*. IEEE Transactions on Mobile Computing (**IEEE TMC**), 2026 (accepted). **Co-corresponding author**. [\[Paper\]](#)
- [J.08] Yuhang Cheng*, Xuecheng Chen*, Yixuan Yang, **Haoyang Wang**, Jingao Xu, Chaopeng Hong, Susu Xu, Xiao-Ping Zhang, Yunhao Liu, Xinlei Chen[#]. *SniffySquad: Patchiness-Aware Gas Source Localization with Multi-Robot Collaboration*. ACM Transactions on Sensor Networks (**ACM TOSN**), 2026. [\[Paper\]](#)
- [J.07] **Haoyang Wang**, Jingao Xu, Xinyu Luo, Ting Zhang, Xuecheng Chen, Ruiyang Duan, Jialong Chen, Yunhao Liu, Jianfeng Zheng, Weijie Hong, Xinlei Chen[#]. *mmE-Loc: Facilitating Accurate Drone Landing with Ultra-High-Frequency Localization*. IEEE Transactions on Mobile Computing (**IEEE TMC**), 2026. [\[Paper\]](#)

- [J.06] **Haoyang Wang**, Ruishan Guo, Pengtao Ma, Ciyu Ruan, Xinyu Luo, Wenhua Ding, Tianyang Zhong, Jingao Xu, Yunhao Liu, Xinlei Chen[#]. *Event Camera Meets Mobile Embodied Perception: Abstraction, Algorithm, Acceleration, Application*. ACM Computing Surveys (**ACM CSUR**), 2026. [\[Paper\]](#) [\[Resources\]](#)
- [J.05] **Haoyang Wang**, Chenyu Zhao, Yuhan Cheng, Xuecheng Chen, Jingao Xu, Chaopeng Hong, Xiao-Ping Zhang, Yunhao Liu, Xinlei Chen[#]. *Aerial Shepherds: Enabling Hierarchical Localization in Heterogeneous MAV Swarms*. IEEE Transactions on Mobile Computing (**IEEE TMC**), 2025. [\[Paper\]](#)
- [J.04] Nan Zhou*, Yuxuan Liu*, **Haoyang Wang***, Fanhang Man, Jingao Xu, Fan Dang, Chaopeng Hong, Yunhao Liu, Xiao-Ping Zhang, Yali Song, Qihua Wang, Xinlei Chen[#]. *CatUA: Catalyzing Urban Air Quality Intelligence through Mobile Crowd-sensing*. IEEE Transactions on Mobile Computing (**IEEE TMC**), 2025. [\[Paper\]](#)
- [J.03] Xuecheng Chen*, **Haoyang Wang***, Yuhan Cheng, Haohao Fu, Yuxuan Liu, Fan Dang, Yunhao Liu, Xinlei Chen[#]. *DDL: Empowering Delivery Drones with Large-scale Urban Sensing Capability*. IEEE Journal of Selected Topics in Signal Processing (**IEEE JSTSP**), 2024. [\[Paper\]](#)
- [J.02] Xuecheng Chen, Zijian Xiao, Yuhan Cheng, Chen-Chun Hsia, **Haoyang Wang**, Jingao Xu, Susu Xu, Fan Dang, Xiao-Ping Zhang, Yunhao Liu, Xinlei Chen[#]. *SOScheduler: Toward Proactive and Adaptive Wildfire Suppression via Multi-UAV Collaborative Scheduling*. IEEE Internet of Things Journal (**IEEE IoT-J**), 2024. [\[Paper\]](#)
- [J.01] 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 (**JSA**), 2021. [\[Paper\]](#)

Workshop Papers

- [W.05] Xinyu Luo, **Haoyang Wang**, Ciyu Ruan, Chenxin Liang, Jingao Xu, Xinlei Chen[#]. *EventTracker: 3D Localization and Tracking of High-Speed Object with Event and Depth Fusion*. **ACM MobiCom Picasso Workshop**, 2024. [\[Paper\]](#)
- [W.04] **Haoyang Wang***, Yuxuan Liu*, Chenyu Zhao, Jiayou He, Wenbo Ding, Xinlei Chen[#]. *CaliFormer: Leveraging Unlabeled Measurements to Calibrate Sensors with Self-supervised Learning*. **ACM UbiComp CPD Workshop**, 2023. **Best Presentation Award**. [\[Paper\]](#)
- [W.03] 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*. **ACM UbiComp CPD Workshop**, 2023. [\[Paper\]](#)
- [W.02] **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 SenSys CML-IoT Workshop**, 2022. [\[Paper\]](#)
- [W.01] 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*. **ACM UbiComp CPD Workshop**, 2022. **Best Paper Award**. [\[Paper\]](#)

Honors & Awards

- 2026 **Shuimu Tsinghua Scholar Program**, Tsinghua University
- 2026 **Outstanding Postgraduate Award**, Beijing & Tsinghua University
- 2025 **Silver Prize**, 50th International Exhibition of Inventions Geneva (DDL project)
- 2024 **National Scholarship (Graduate Student)**, China
- 2023 **First Place**, Low-Altitude Economy Flight Management Challenge (Creative Competition), Meituan

2023 **Best Presentation Award**, ACM UbiComp CPD Workshop (CaliFormer)

2022 **Best Paper Award**, ACM UbiComp CPD Workshop (DeliverSense)

Academic Service

Technical Program Committee Member

- AAAI 2025, 2026
- ACM IASA Workshop 2025
- ACM SenSys Artifact Evaluation 2024

Journal Reviewer

- IEEE TMC, ACM IMWUT / UbiComp, IEEE RA-L 2025 – Present

Teaching Experience

Teaching Assistant

- **Introduction to AIoT**, Graduate Course, Tsinghua University 2023, 2024, 2025
- **Urban Low-Altitude Messenger**, Graduate Course, Tsinghua University & Meituan 2024