Chenyu Zhao

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Education

Tsinghua University, China	M.Sc in Data Science and Information Technology, GPA : 3.87/4.0	*2022 – 2025*
Northwest University, China	B.E. in Electronic Information Science and Technology, GPA : 3.69/4.0	*2018 – 2022*
University of Essex, UK	B.S. in Electronic System Engineering, **First Honour Class**	*2018 – 2022*

Research Interests

Mobile Computing, Cyber-Physical Systems, Internet of Things, Sensing, Embedded AI, Robotics, Quadrotors and Drones.

Research Publications

Conference Proceedings (Published)

1. **Chenyu Zhao**, Ciyu Ruan, Jingao Xu, Haoyang Wang, Shengbo Wang, Jirong Zha, Jiaqi Li, Zheng Yang, Yunhao Liu, Xiao-Ping Zhang, and Xinlei Chen. *"Foes or Friends: Embracing Ground Effect for Edge Detection on Lightweight Drones"*. In: 2024 Proceedings of the 30th Annual International Conference on Mobile Computing and Networking (MobiCom 2024). 2024.
2. Haoyang Wang, Jingao Xu, **Chenyu Zhao**, Zihong Lu, Yuhan Cheng, Xuecheng Chen, Xiao-Ping Zhang, Yunhao Liu, and Xinlei Chen. *"TransformLoc: Transforming MAVs into Mobile Localization Infrastructures in Heterogeneous Swarms"*. In: Proceedings of the 2024 IEEE International Conference on Computer Communications (INFOCOM 2024). 2024.
3. **Chenyu Zhao**, Haoyang Wang, Jiaqi Li, Fanhang Man, Shilong Mu, Wenbo Ding, Xiao-Ping Zhang, and Xinlei Chen. *"SmoothLander: A Quadrotor Landing Control System with Smooth Trajectory Guarantee Based on Reinforcement Learning"*. In: Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing (Ubicomp CPD 2023). 2023.
4. Ciyu Ruan*, **Chenyu Zhao***, Chenxin Liang, Xinyu Luo, Jingao Xu, and Xinlei Chen. *"Distill Drops into Data: Event-based Rain-Background Decomposition Network"*. In: 2024 Proceedings of 7th International Workshop on Physics Embedded AI Solutions in Mobile Computing (PICASSO 2024). 2024.
5. Jiaqi Li*, **Chenyu Zhao***, Yuzhu Mao, Xinlei Chen, Wenbo Ding, Jianzong Wang, and Xiaoyang Qu. *"FormerReckoning: Physics Inspired Transformer for Accurate Inertial Navigation"*. In: 2024 Proceedings of 7th International Workshop on Physics Embedded AI Solutions in Mobile Computing (PICASSO 2024). 2024.
6. Haoyang Wang*, Yuxuan Liu*, **Chenyu Zhao**, Jiayou He, Wenbo Ding, and Xinlei Chen. *"CaliFormer: Leveraging Unlabeled Measurements to Calibrate Sensors with Self-supervised Learning"*. In: Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing (Ubicomp CPD 2023). 2023.
7. **Chenyu Zhao**, Ciyu Ruan, Shengbo Wang, Jirong Zha, Haoyang Wang, Jiaqi Li, Yuxuan Liu, Xuzhe Wang, and Xinlei Chen. *"Demo Abstract: Bio-inspired Tactile Sensing for MAV Landing with Extreme Low-cost Sensors"*. In: 2024 ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2024). 2024.
8. Xuzhe Wang, Chen Gao, Weichen Zhang, Chengzhao Yu, **Chenyu Zhao**, and Xinlei Chen. *"Demo Abstract: A Spatio-Temporal Embedding Model for Public Transit-Guided Volunteer Task Matching"*. In: 2024 ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2024). 2024.

*indicates co-primary author.

Journals (Under Review)

1. Haoyang Wang, Jingao Xu, **Chenyu Zhao**, Yuhan Cheng, Xuecheng Chen, Chaopeng Hong, Xiao-Ping Zhang, Yunhao Liu, and Xinlei Chen. *"Aerial Shepherds: Enabling Hierarchical Localization in Heterogeneous MAV Swarms"*. In: IEEE Transactions on Mobile Computing (TMC). 2024.

2. **Chenyu Zhao**, Jingao Xu, Ciyu Ruan, Haoyang Wang, Shengbo Wang, Jirong Zha, Jiaqi Li, Zheng Yang, Yunhao Liu, Xiao-Ping Zhang, and Xinlei Chen. *"Flight Dynamics to Sensing Modalities: Exploiting Drone Ground Effect for Accurate Edge Detection"*. In: IEEE Transactions on Mobile Computing (TMC). 2025.

Researches, Projects, and Engineering Works

1 | Extreme Low-Cost Micro Aerial Vehicle Sensing based on the Ground Effect in Physical World. --*MobiCom* *2024*

- We propose AirTouch, the first system to turn the negative ground effect into a positive sensing modality for precise material and platform edge detection, which can be used in terrain mapping and emergent landing.
- By combining IMU sampling and motor commands, we create an effective approach to characterize the ground effect under the flight control system, including Fluctuation Components Feature Extraction, Cascaded Cross-Spectrum Feature Fusion, and Aerodynamic-Informed Double Phase Physical Filter. The whole components with a lightweight neural network are deployed on a tiny drone weighing 36 grams in total.
- This paper has been awarded all four badges from ACM Artifact Evaluation, including Artifacts Available, Artifacts Functional, Artifacts Reusable, and Artifacts Replicated.

2 | A Quadrotor Landing Control System with Smooth Trajectory Guarantee Based on Reinforcement Learning. *2023*

- We propose the SmoothLander system to break through the hardware limitation to empower MAV with low-cost sensors to perform stable and smooth flight during the landing process.
- We utilize RL to predict the disturbance caused by the ground effect and MAV takes corresponding command action to avoid oscillation. The performance is evaluated using both physical feature-based simulations and in-field experiments.

3 | TransformLoc: Transforming MAVs into Mobile Localization Infrastructures in Heterogeneous Swarms. --*INFOCOM* *2024*

- We construct a collaborative drone-based localization system to transform advanced MAVs into mobile localization infrastructures, specifically designed for low-cost and resource-constrained MAVs.
- We design an error-aware joint location estimation model to perform intermittent joint location estimation for low-cost MAVs and a proximity-driven adaptive grouping-scheduling strategy to allocate resources of advanced MAVs dynamically.

4 | Hexapod Robot for Ecological Monitoring of Plant Diversity. *2020*

- An intelligent hardware system based on Raspberry Pi with sensors is designed and built. With the shape of the hexapod robot (with 6 legs), plant recognition, remote network communication and control, autonomous drive, environmental data monitoring, and other functions are realized.

5 | Intelligent Guide Machine for Visual-Disabled People based on Sensors. *2020*

- Design and build an intelligent hardware system based on Raspberry Pi and sensors, using software algorithms to achieve functions including guiding and obstacle avoidance, path planning and navigation, voice control and broadcasting, remote communication control, etc., providing an assistive device for blind people's travel.

6 | PAC-MAN: The Implementation of VGA display on Basys3 FPGA Board. *2020*

- Implementation of the PAC-MAN game on the Xilinx Basys 3 FPGA platform: design a digital circuit that includes a VGA signal driving module, frequency dividers, a display graphics controller, operation and switch trigger, and multiplexers, etc.

7 | Digital System Design for RS232 Protocol Data Communication. *2019*

8 | A Logistics Distribution Strategy Optimization System Based on Genetic Algorithm. *2020*

9 | Brain-Computer Interface Application: EEG Signal for Motion Recognition based on Deep Learning. *2022*

10 | Building and Empowering A Drone With Navigation from RGBD Camera, Motors, Power System, and Edge Computer. *2023*

Honors and Certifications

National Scholarship for Undergraduate 0.38% | *Ministry of Education of the People's Republic of China* *September 2020*
National Scholarship for Postgraduate (Nominee) 1.2% | *Ministry of Education of the PRC* *September 2024*
Student Travel Grant(STG) for MobiCom 2024 | *SIGMOBILE* *November 2024*
Fisrt-honor Scholarship of the University 1.5% | *Tsinghua University* *October 2024*
Second-honor Scholarship of the School 8.3% | *Tsinghua University* *November 2023*
First-honor Scholarships of the University $1/117$ | *Northwest University* *November 2020 and 2021*
Competition Pioneer Scholarship $1/613$ | *Northwest University* *March 2022*
Provincial Outstanding Graduate 0.072% | *Department of Education of Shaanxi Province* *June 2022*
University Outstanding Graduate $1/413$ | *Northwest University* *June 2022*
IELTS Band: 6.5 | *British Council* *August 2024*

Competition Awards

1 | The 1st Prize of in International Workshop on Learning and Information Theory (WOLIT'24). | $Ranking: 1/20$ *2024*
2 | The 3rd Prize of 2024 Tsinghua TBSI Retreat Poster Contest. | $Ranking: 4/18$ *2024*
3 | The 1st prize of the Low-Altitude Economy Flight Management Challenge (Meituan) in 2024. | $Award: 50kRMB$ *2024*
4 | The Bronze Award of the Global Competition on Design for Future Education in 2023. | $Ranking: 4/107$ *2023*
5 | The National Third Prize of the 13th China University Students Computer Design Competition in 2020. *2020*
6 | The Provincial Project of Innovation and Entrepreneurship Training for University Students in 2020. *2020*
7 | The Provincial First Prize of the 2020 National Undergraduate Mathematical Modeling Competition. *2020*
8 | The 3rd Prize of the National Undergraduate Embedded Chip and System Design Competition in 2020. *2020*
9 | The 2nd Prize of the National College Students' Big Data Analysis and Visualization Competition of Chang Feng Cup. *2020*
10 | The 2nd Prize of the 2020 National College Mathematical Modeling Competition. *2020*
11 | The 2nd Prize of the 2020 "Epidemic Spreading and Controlling" Mathematical Modeling College Competition. *2020*

And other **5** awards

Technical Skills

Programming Languages :

Software: Python, C/C++, Matlab, Latex, UML, HTML, XML, JSON, CSS. | Hardware: VHDL(FPGA).

Engineering and Developments :

(1) Quadrotors and Drones, Flight Controller, Robotics, Sensors.

(2) Deep Learning, Reinforcement Learning, Self-Supervised Learning.

(3) FPGA, VHDL, A/D Circuit.

(4) Image Processing, Raspberry Pi, Android Application Development, Network Communication.

(5) Visual Localization, Simultaneous Localization and Mapping(SLAM), mmWave Radar, Acoustic Localization, Motion Capture System, Edge AI Acceleration Chips.

After-Class Experiences

1 | Academic Department of the Student Union: Organized competitions and morning reading. *2018 – 2019*
2 | Youth Volunteer Association: Participated in volunteer work for dozens of times. *2018 – 2019*
3 | Taekwondo Club: Organized daily training, publicity, activities, and other affairs in the club. *2018 – 2019*

Hobbies and Leisure

Photography, LEGO Bricks, Cycling, Erhu, Skateboarding, Robotics.