

# YE TIAN

Ph.D. student, CSE, University of California, San Diego, CA, USA.

[🌐 Homepage | 🏠 SEE Lab | 📄 Google Scholar | 🔗 LinkedIn | ✉ Email: yet002@ucsd.edu]

## EDUCATION

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<b>UCSD</b> , Department of Computer Science and Engineering	<i>Sep. 2024 – Present</i>
<i>Advisor: IEEE/ACM Fellow Prof. Tajana Rosing</i>	Ph.D.
<b>USTC</b> , College of Computer Science and Technology	<i>Sep. 2021 – Jun. 2024</i>
<i>Advisor: IEEE/ACM Fellow Prof. Xiang-Yang Li</i>	M.S.
<b>Northwest A&amp;F University</b> , College of Information Engineering	<i>Aug. 2017 – Jun. 2021</i>
<i>Advisor: Prof. Yong Deng and Prof. Bingyi Kang</i>	B.S.

## INTERNSHIP

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<b>NAIST (Japan)</b> , Interactive Media Design Laboratory	<i>Jul. 2024 - Sep. 2024</i>
<i>Director: IEEE Fellow Prof. Hirokazu Kato</i>	– Research Intern (full time)
Scope: Human-computer interaction design based on AR/VR glasses and mobile computing.	
<b>IDATA</b> , Intelligent Perception Research Center	<i>Oct. 2023 - May 2024</i>
<i>Director: IEEE/ACM Fellow Prof. Xiang-Yang Li</i>	– Research Intern (part time)
Scope: Automated analysis and generation of industrial electrical diagrams.	
<b>Daqo Group Industry</b> , AI Automation Design Department	<i>Oct. 2022- Oct. 2023</i>
<i>Director: Prof. Jiahui Hou</i>	– Research Intern (part time)
Scope: Circuit diagram component and loop recognition and understanding based on CV and AI algorithms.	
<b>DAII</b> , Smart City Algorithm Design Group	<i>Apr. 2021 - Sep. 2021</i>
<i>Director: IEEE Fellow Prof. Yanyong Zhang and Prof. Hao Zhou</i>	– Research Intern (full time)
Scope: IoT device authentication algorithm; Secure IoT interaction platform deployment.	

## SKILLS

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**ML/AI Skills:** Large Language Model (LLM) · LLM Agent · Prompt Engineering · RAG · Machine Learning · Deep Learning · Multimodal Learning.

**Mobile/Edge Computing:** Signal Processing · Time Series Modeling · Sensor-to-Text Representation · 3D Perception (Image and Point Cloud) · On-Device Inference.

**Tools/Libraries:** Linux · Git · Kubernetes · AWS · Azure · Docker · PyTorch · Tensorflow · OpenCV...

## SELECTED RESEARCH PROJECTS

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**Multimodal wearable sensing with LLMs for personalized health.** *Sep. 2024 – Present*

- We capture multimodal signals from ubiquitous wearables and mobile devices and leverage LLMs to infer everyday human behavior, enable long-horizon health reasoning, and deliver personalized recommendations. Recently, we introduced **DailyLLM**, a system that uses sensors on smartphones and smartwatches to generate activity logs and context-rich summaries. With only a 1.5B-parameter model, it improves precision by **17%** over a **70B**-parameter state-of-the-art model, delivers nearly **10×** faster inference, and is deployable on edge devices such as Raspberry Pi (*SenSys'25 and MASS'25*).
- We also released a large-scale health-reasoning benchmark (diet, activity, sleep, emotion) with **22,573** questions, spanning tasks from factual retrieval to cross-dimensional, long-horizon reasoning. We performed fine-grained evaluations on **8** open-source and **3** proprietary LLMs and distilled key insights (*ICLR'26, under review*). Additionally, we are developing **multi-agent LLM systems** for complex health reasoning and investigating **efficient, privacy-preserving** training and inference in real-world edge and cloud deployments.

We construct a multimodal 3D scene knowledge graph from LiDAR and RGB imagery and develop a **knowledge-graph-augmented LLM framework** for complex reasoning and decision in autonomous driving. First, we fuse multi-sensor streams to perform **3D reconstruction**, **entity/relation extraction**, and **temporal association**, yielding a scene-level knowledge graph. Next, graph-aware retrieval and structured prompting strengthen the LLM’s reasoning, enabling robust scene understanding and task-level decision-making in 3D environments. We further integrate **uncertainty estimation** with online updates to handle **dynamic scenes** and investigate resource-efficient edge deployment (*MobiSys’26, under review*).

We introduced **DroneFL**, the first federated learning (FL) framework tailored for **efficient multi-UAV target tracking**. It employs a lightweight on-device model that predicts target trajectories from onboard sensor streams. To address data heterogeneity that hinders federated convergence, DroneFL uses a position-invariant architecture with altitude-based adaptive instance normalization. Experiments show that, compared with distributed non-FL frameworks, DroneFL reduced prediction error by **6%–83%** and tracking distance by **0.4%–4.6%**, and it can run in real time on a Raspberry Pi 5 (*ICRA’26, under review*).

### Efficient inference with hyperdimensional computing (HDC).

Oct. 2024 – Sep. 2025

We presented **FHDnn**, a collaborative FL framework that integrates neural networks with hyperdimensional computing (HDC). We established HDC convergence under a generalized FL setting, offering a formal **theoretical guarantee** for HDC-based federated methods. We further designed **three communication strategies** that boost communication efficiency by **32×**. In experiments, FHDnn delivers **3×** faster convergence than strong baselines and cuts communication cost by **2,112×**, while remaining robust to **bit errors**, **noise**, and **packet loss** on unreliable links. (*ACM Transactions on Internet of Things, 2025*)

We proposed **HyperLiDAR**, the first hyperdimensional-computing (HDC)-based **lightweight LiDAR segmentation framework** that *adapts to post-deployment point-cloud scans*. HyperLiDAR coupled a pretrained feature extractor with HDC training to enable resource-efficient on-device adaptation. We further introduced a **buffer selection strategy** to cope with high per-scan data volumes. Across two standard LiDAR segmentation benchmarks and three representative edge devices, HyperLiDAR surpassed state-of-the-art baselines and accelerates training by **13.8×**. (*DAC’26, under review*)

### Mobile & Ubiquitous Sensing and Interaction system.

Sep. 2021 - Jun. 2024

We developed a multimodal smartwatch interaction system that fuses visual and IMU signals to recognize 12 fine-grained gestures, enabling convenient and robust user interaction. (*INFOCOM’22*)

We built a touchless, password-free lip-reading authentication system via Wi-Fi backscattering and analyzed the semantics expressed by lip motions. We further introduced the first semantic-level silent lip-reading interface over wireless signals to assist users with hearing loss and language disorders in communicating more effectively. (*IWQoS’22*)

We investigated the resonance characteristics of MEMS gyroscopes and interference in parallel radio-frequency multi-tag communication. Guided by analysis and experiments, we proposed a secure encryption system for mobile communications (*IEEE Transactions on Mobile Computing, 2024*) and designed an algorithm that robustly suppresses in-band RF interference (*MobiSys’24*).

## SELECTED PUBLICATIONS

Co-first authors are marked with \*. For a complete list, please refer to my [Google Scholar].

1. **Ye Tian**, Xiaoyuan Ren, Jingyi Zhang, Xiaofan Yu, Onat Gungor, Tajana Rosing. *KLDrive: Fine-Grained 3D Scene Reasoning for Autonomous Driving based on Knowledge Graph*. The 23rd ACM International Conference on Mobile Systems, Applications, and Services, **MobiSys 2026 (under review)**.

2. **Ye Tian\***, Zihao Wang\*, Onat Gungor, Xiaoran Fan, Tajana Rosing. *MultiLifeQA: A Multidimensional Lifestyle Question Answering Benchmark for Comprehensive Health Reasoning with LLMs*. The International Conference on Learning Representations, **ICLR 2026 (under review)**.
3. Xiaofan Yu, Yuwei Wu, Katherine Mao, **Ye Tian**, Vijay Kumar, Tajana Rosing. *DroneFL: Federated Learning for Multi-UAV Visual Target Tracking*. The International Conference on Robotics and Automation, **ICRA 2026 (under review)**.
4. Ivannia Gomez Moreno\*, Yi Yao\*, **Ye Tian\***, Xiaofan Yu, Flavio Ponzina, Jingyi Zhang, Michael Sullivan, Mingyu Yang, Hun Seok Kim and Tajana Rosing. *HyperLiDAR: Adaptive Post-Deployment LiDAR Segmentation via Hyperdimensional Computing*. Design, Automation and Test in Europe Conference, **DAC 2026 (under review)**.
5. **Ye Tian**, Xiaoyuan Ren, Zihao Wang, Onat Gungor, Xiaofan Yu, Tajana Rosing. *DailyLLM: Context-Aware Activity Log Generation Using Multi-Modal Sensors and LLMs*. The 22nd IEEE International Conference on Mobile Ad-Hoc and Smart Systems, **MASS 2025**.
6. **Ye Tian**, Onat Gungor, Xiaofan Yu, Tajana Rosing. *Fine-grained Contextualized Activity Logs Generation based on Multi-Modal Sensor Data and LLM*. ACM Conference on Embedded Networked Sensor Systems, **SenSys 2025**.
7. **Ye Tian\***, Rishikanth Chandrasekaran\*, Kazim Ergun\*, Xiaofan Yu, Tajana Rosing. *Federated Hyperdimensional Computing: Comprehensive Analysis and Robust Communication*. ACM Transactions on Internet of Things, **TIoT 2025**.
8. Shanyue Wang, Yubo Yan, Feiyu Han, **Ye Tian**, Yuxin Ding, Panlong Yang and Xiang-Yang Li. *MultiRider: Taming In-band Interferences in OFDM Backscatter for Parallel Communication*. ACM International Conference on Mobile Systems, Applications, and Services, **MobiSys 2024**.
9. **Ye Tian**, Hao Zhou, Haohua Du, Chenren Xu, Jiahui Hou, Dong Ren and Xiang-Yang Li. *BackLip: Passphrase-Independent Lip-reading User Authentication with Backscatter Signals*. IEEE/ACM 31th International Symposium on Quality of Service, **IWQoS 2023**.
10. Kaiwen Guo, Hao Zhou, **Ye Tian**, Wangqiu Zhou, Yusheng Ji and Xiang-Yang Li. *Mudra: A Multi-Modal Smartwatch Interactive System with Hand Gesture Recognition and User Identification*. IEEE International Conference on Computer Communications, **INFOCOM 2022**.

## SELECTED HONORS AND AWARDS

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Best Poster Award ( <b>top 3</b> ) on TILOS Industrial Day,	-2025
UCSD CSE Fellowship,	-2024
National Fellowship ( <b>top 1%</b> ),	-2023
Huawei Fellowship ( <b>top 2%</b> ),	-2022
Outstanding Student Leader in Graduate Student Union,	-2022, 2021
Outstanding Graduates of the Whole University ( <b>top 2%</b> ),	-2021
International Mathematical Contest in Modeling - Honorable Mention Award,	-2021
Lixin Tang Fellowship ( <b>top 0.2%</b> )	-2020
National Encouragement Fellowship ( <b>top 3%</b> ),	-2020, 2019, 2018
First Class Fellowship,	-2020, 2019, 2018
One of the 100 Campus Stars - Top Ten Scientific Research Stars ( <b>top 0.5%</b> ),	-2020
Outstanding Students and Student Leader,	-2020, 2019, 2018
Forestry Innovation and Entrepreneurship Competition - National Semi-Finalist Award,	-2020
Outstanding Representative of Innovation and Entrepreneurship, ( <b>top 0.2%</b> )	-2020
College Students Three Innovation Challenge - Provincial Second Prize,	-2019
“Internet +” College Student Competition - Gold Award,	-2019
Outstanding Representative of Social Practice.	-2018

## ACADEMIC SERVICE

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### Reviewer for Journal Manuscript Submissions

- ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)
- ACM Transactions on Embedded Computing Systems (TECS)
- ACM Transactions on Internet Technology (TOIT)
- ACM Transactions on Sensor Networks (TOSN)
- IEEE Internet of Things Journal (IoT-J)
- Engineering Applications of Artificial Intelligence (EAAI)
- Health Information Science and Systems (HISC)
- Applied Soft Computing,
- Soft Computing
- Journal of Selected Topics in Signal Processing

### Conference Roles Session Chair

- IEEE/ACM IWQoS 2023
- IEEE Bigcom 2022

### Conference Volunteer

- National Forum for CS Department Chairs
- Deans in Colleges and Universities

## STUDENT ACTIVITIES

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Teaching Assistant	2022-2023
Leader of Graduate Student Union	2021-2022
Vice President - Tang Lixin Fellowship "Xinji Community"	2020-2021
Volunteer - Rural Survey and Research Activities in Poor Areas of Northwest China	2018-2019
Class Teacher's Student Assistant	2018-2021
Class Monitor	2017-2021