

# YE TIAN

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

## EDUCATION

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

## INTERNSHIP

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NAIST (Japan), Interactive Media Design Laboratory	<i>Summer 2024</i>
Director: IEEE Fellow Prof. Hirokazu Kato	– Research Intern
Daqo Group Industry, AI Automation Design Department	<i>Summer 2023</i>
Director: Prof. Jiahui Hou	– Research Intern
Deqing Alpha Innovation Institute, Smart City Algorithm Design Group	<i>Summer 2021</i>
Director: IEEE Fellow Prof. Yanyong Zhang	– Research Intern

## 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.

**3D scenarios reasoning in UAVs and autonomous driving.** *Jun. 2025 – Present*

- 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*).
- 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 on-line updates to handle **dynamic scenes** and investigate resource-efficient edge deployment (*ongoing*).

- 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×**. (*DATE'26*, under review)

## Mobile &amp; 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**\*, 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)**.
2. 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)**.
3. 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, **DATE 2026 (under review)**.
4. **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**.
5. **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**.
6. **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**.

7. Junyang Zhang, Jiahui Hou, **Ye Tian** and Xiang-Yang Li. WordWhisper: Exploiting Real-time, Hardware-dependent IoT Communication against Eavesdropping. IEEE Transactions on Mobile Computing, **TMC 2024**.
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 AND STUDENT ACTIVITIES

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Volunteer - National Forum for CS Department Chairs	-2023
Volunteer - Deans in Colleges and Universities	-2023
Session Chair - IEEE/ACM IWQoS 2023	-2023
Session Chair - IEEE Bigcom 2022	-2022
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