YE TIAN

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

[🌐 Homepage | 🏠 SEE Lab | 🎓 Google Scholar | 💼 LinkedIn | ✉ Email:`yet002@ucsd.edu`]

EDUCATION

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

INTERNSHIP

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

SELECTED RESEARCH PROJECTS

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

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×**. *(DATE'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***, 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

Best Poster Award (**top 3**) on TILOS Industrial Day,	-2025
UCSD CSE Fellowship,	-2024
National Fellowship (**top 1%**),	-2023
Huawei Fellowship (**top 2%**),	-2022
Outstanding Student Leader in Graduate Student Union,	-2022, 2021
Outstanding Graduates of the Whole University (**top: 2%**),	-2021
International Mathematical Contest in Modeling - Honorable Mention Award,	-2021
Lixin Tang Fellowship (**top: 0.2%**)	-2020
National Encouragement Fellowship (**top: 3%**),	-2020, 2019, 2018
First Class Fellowship,	-2020, 2019, 2018
One of the 100 Campus Stars - Top Ten Scientific Research Stars (**top: 0.5%**),	-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, (**top: 0.2%**)	-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

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