YE TIAN

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

SKILLS

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

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 autonomous driving and UAVs. *Jun. 2025 – Present*

· 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

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

Invited Reviewer for: *Applied soft computing, Engineering applications of artificial intelligence, Health information science and systems, Soft computing.*

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

STUDENT ACTIVITIES

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