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
Scope: Human-computer interaction design based on AR/VR glasses and mobile computing.
Daqo Group Industry, AI Automation Design Department — ***Summer 2023***
Director: Prof. Jiahui Hou – Research Intern
Scope: Automatic analysis and generation of circuit diagrams based on computer vision and AI algorithms.
Deqing Alpha Innovation Institute, Smart City Algorithm Design Group — ***Summer 2021***
Director: IEEE Fellow Prof. Yanyong Zhang – Research Intern
Scope: IoT device authentication algorithm; Secure IoT interaction platform deployment.

SKILLS

ML/AI Skills: Large Language Model (LLM) · LLM Agent · Prompt Engineering · Retrieval-Augmented Generation (RAG) · Machine Learning · Deep Learning · Multimodal Learning · Knowledge Graphs.

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

Tools: Linux · Git · Docker · Kubernetes · AWS · Azure · CUDA · Raspberry Pi · NVIDIA Jetson.
Libraries: PyTorch · TensorFlow · Hugging Face · scikit-learn · NumPy · pandas · Matplotlib · OpenCV.

SELECTED RESEARCH PROJECTS

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

· **Highlights:** Design LLM-augmented multimodal methods and pipelines that captures sensing data from wearable and mobile devices, learn sensor-to-text representations, and adapt LLMs to infer everyday behavior, enable long-horizon health reasoning, and deliver personalized recommendations.

· Proposed DailyLLM, an **LLM-augmented** multimodal pipeline that learns **sensor-to-text** representations and uses **structured prompting** to generate context-rich activity logs from smartphone and smartwatch signals; with a **1.5B** model, achieved **+17%** BERTScore precision over a **70B** SOTA and **∼10×** faster inference; deployed on **edge** devices (Raspberry Pi). ***(SenSys'25 and MASS'25)***

· Released MultiLifeQA, a lifestyle health QA benchmark (diet/activity/sleep/emotion) with 22,573 questions spanning tasks from factual retrieval to cross-dimensional reasoning; evaluated **8** open-source and **3** proprietary LLMs with fine-grained metrics and distilled key insights. ***(ICLR'26, under review)***

· Designing **Multi-agent LLM** systems for complex health reasoning and investigate **efficient**, **privacy-preserving** training/inference for real-world **edge**–**cloud** deployments.***(ongoing)***

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

· **Highlights:** Combine federated learning with knowledge-graph–augmented LLMs to understand 3D scenes and, under changing conditions, enable UAVs and vehicles to make consistent, safe decisions—delivering reliable edge autonomy.

· Proposed DroneFL, the first **federated learning** framework for **multi-UAV** target tracking; employed a lightweight **on-device** trajectory predictor over onboard sensor streams and mitigated **inter-UAV covariate shift** (viewpoint/altitude) and **client drift** via a **position-invariant** backbone with **altitude-aware adaptive instance normalization**, stabilizing federated convergence; achieved 6%–83% lower prediction error and 0.4%–4.6% shorter tracking distance vs. non-federated distributed baselines, and runs in real time on Raspberry Pi 5. ***(ICRA'26, under review)***

· 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-making in autonomous driving; fuse multi-sensor streams for **3D reconstruction**, entity relation extraction, and **temporal association** to yield a scene-level KG; apply **graph-aware retrieval** and **structured prompting** to strengthen LLM reasoning for robust scene understanding and task-level decisions; integrate **uncertainty estimation** with online updates to handle dynamic scenes and investigate resource-efficient edge deployment ***(ongoing)***.

(iii) Efficient inference with hyperdimensional computing (HDC). *Oct. 2024 – Sep. 2025*

· **Highlights:** Efficient training and inference on equipment. Based on hyper-dimensional computing, real-time learning and inference are provided on resource-constrained edge hardware with minimal computing and communication overhead.

· Proposed FHDnn, a collaborative **federated learning** framework that integrates neural networks with **hyperdimensional computing**; established HDC convergence under a generalized FL setting, providing a formal theoretical guarantee for HDC–based federated methods; designed **three communication strategies** that improve communication efficiency by **32**×; demonstrated **3**× faster convergence vs. strong baselines and **2,112**× lower communication cost, while remaining robust to **bit errors**, **noise**, and **packet loss** on unreliable links. ***(ACM Transactions on Internet of Things, 2025)***

· Proposed HyperLiDAR, the first **hyperdimensional computing** (HDC)–based lightweight **LiDAR-segmentation** framework that adapts to post-deployment point-cloud scans; coupled a pretrained feature extractor with HDC training for resource-efficient **on-device** adaptation and introduced a buffer-selection strategy to handle high per-scan data volumes; across two standard LiDAR-segmentation benchmarks and three representative edge devices, surpassed state-of-the-art baselines and accelerated training by **13.8**×. ***(DATE'26, under review)***

(iv) Mobile & Ubiquitous Sensing and Interaction system. *Sep. 2021 - Jun. 2024*

· **Highlights:** Design secure and efficient Internet of Things (IoT) interaction and communication systems based on mobile/ubiquitous sensing technologies and artificial intelligence algorithms, and also consider deployability on edge devices.

· Proposed a **multimodal smartwatch interaction** system that fuses **visual and IMU signals** to recognize 12 fine-grained gestures, enabling robust and friendly user interaction. ***(INFOCOM'22)***

· Proposed a touchless, password-free lip-reading authentication system using Wi-Fi backscatter; analyzed the semantic content of lip motions and introduced the first semantic-level silent **lip-reading interface** over wireless signals to aid users with hearing loss and speech/language impairments. ***(IWQoS'23)***

· Analyzed **MEMS gyroscope resonance** and **interference** in parallel **RF multi-tag** communication; proposed a secure encryption system for mobile communications ***(IEEE Transactions on Mobile Computing, 2024)***; designed an algorithm that robustly suppresses in-band RF interference, improving link reliability in multi-tag settings ***(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