Quanling Zhao

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Last Update: 1/28/2025

Research Interest

- Machine Learning, Kernel method.
- Novel learning paradigms: Online, Few-shot, Federated, Continual, Unsupervised, Multimodal Learning.
- Efficient neuromorphic computing methods: Vector Symbolic Architecture/Hyperdimensional Computing.

Education

•University of California San Diego *2024 - Present*
PhD - Computer Science CA, USA

•University of California San Diego *2023*
B.S. - Computer Science CA, USA

Research Experience

System Energy Efficiency Lab *2021 - Present*
Researcher, Advisor: Tajana Rosing UCSD

- Efficient and theoretically founded machine learning algorithms applicable in practical settings.
- Theory of hyperdimensional computing / vector symbolic architecture.
- Edge computing and embedded intelligence.

Publications

1. Le Zhang*, **Quanling Zhao*(equal contribution)**, Run Wang, Shirley Bian, Onat Gungor, Flavio Ponzina, and Tajana Rosing. "Offload Rethinking by Cloud Assistance for Efficient Environmental Sound Recognition on LPWANs" - ACM Conference on Embedded Networked Sensor Systems (**SenSys**), 2025
2. **Quanling Zhao**, Anthony Thomas, Ari Brin, Xiaofan Yu, Tajana Rosing , "Bridging the Gap between Hyperdimensional Computing and Kernel Methods via the Nyström Method" - *AAAI Conference on Artificial Intelligence (**AAAI**), 2025*
3. **Quanling Zhao**, Xiaofan Yu, Shengfan Hu, Tajana Rosing, "MultimodalHD: Federated Learning Over Heterogeneous Sensor Modalities using Hyperdimensional Computing" - *Design, Automation, and Test in Europe (**DATE**), 2024*
4. Xiaofan Yu, Ludmila Cherkasova, Harsh Vardhan, **Quanling Zhao**, Emily Ekaireb, Xiyuan Zhang, Arya Mazumdar, Tajana Rosing, "Async-HFL: Efficient and Robust Asynchronous Federated Learning in Hierarchical IoT Networks" - *ACM/IEEE Conference on Internet of Things Design and Implementation (**IoTDI**), 2023*

Workshop & Poster and Demo

1. Run Wang*, Shirley Bian*, Xiaofan Yu, **Quanling Zhao**, Le Zhang, Tajana Rosing, "Poster: Resource-Efficient Environmental Sound Classification Using Hyperdimensional Computing", ACM Conference on Embedded Networked Sensor Systems (**SenSys**), 2024
2. **Quanling Zhao**, Anthony Thomas, Ari Brin, Xiaofan Yu, Tajana Rosing, "Unleashing Hyperdimensional Computing with Nyström Method based Encoding" - *NeurIPS Workshop on ML with New Compute Paradigms (**MLNCP@NeurIPS**), 2023*
3. **Quanling Zhao**, Xiaofan Yu, Tajana Rosing, ""Poster Abstract: Attentive Multimodal Learning on Sensor Data using Hyperdimensional Computing" - *ACM/IEEE International Conference on Information Processing in Sensor Networks (**IPSN**), 2023*
4. **Quanling Zhao**, Kai Lee, Jeffrey Liu, Muhammad Huzaifa, Xiaofan Yu, Tajana Rosing, "FedHD: Federated Learning with Hyperdimensional Computing" - *ACM Annual International Conference on Mobile Computing And Networking (**MobiCom**) Demo, 2022*
5. Emily Ekaireb, Xiaofan Yu, Kazim Ergun, **Quanling Zhao**, Kai Lee, Muhammad Huzaifa, Tajana Rosing, "ns3-fl: Simulating Federated Learning with ns-3" - *Workshop on ns-3 (**WNS3**), 2022*

Services

- **IJCANN 2025** - Reviewer
- **MLNCP@NeurIPS 2024** - Reviewer

Centers and Grants

- **CoCoSys**: Center for the Co-Design of Cognitive Systems, one of seven Joint University Microelectronics Program (JUMP) 2.0 academic research centers co-sponsored by the Semiconductor Research Corporation (SRC) and Defense Advanced Research Projects Agency (DARPA)
- **TILOS**: The Institute for Learning-Enabled Optimization at Scale, a National Artificial Intelligence (AI) Research Institute funded by the National Science Foundation (NSF)
- **National Science Foundation Grants**: #2003279, #1826967, #2100237, #2112167, #1911095, #2112665

Awards

Computer Science & Engineering annual Awards *June 2023*
Excellence in Research - One among two recipients in graduating class. UCSD

Mentoring

- Run Wang (BS 2026 at UCSD) **Publication:** Sensys'24 Poster
- Shirley Bian (BS 2026 at UCSD) **Publication:** Sensys'24 Poster
- Ari Brin (BS 2024 at UCSD) **Publication:** AAAI'24

Courses & Skills

- Language: English (Full professional proficiency), Chinese (Native)
- Java, C/C++, Python, Matlab, System Verilog.
- LaTeX, Git, Markdown, Kubernetes.
- Build deep learning architectures.
- Math: Statistics/probability, calculus, differential eq, discrete, graph theory, linear optimization, linear algebra.
- Computer Science: Networks, programming language, cryptography, computing theory, data structure, circuits/computer architecture, ML/AI/DL/Recommander System.