

# XIAOFAN YU

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## RESEARCH INTERESTS

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My research sits at the intersection of Embedded Systems, Edge Computing, Machine Learning and Networks Optimization, mainly for Internet of Things (IoT) applications.

- Online, self-supervised, continual, multimodal and federated learning algorithms in real-world scenarios
- Neuromorphic computing on low-power IoT devices
- Application-driven IoT systems and networks design, optimization and deployment for long-term reliability and efficiency

## HONORS AND AWARDS

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Rising Stars in ML and Systems	2024
Best Poster Award of Theme 1, JUMP 2.0 CoCoSys Annual Review	2024
ACM SIGBED Student Research Competition (SRC) Second Runners-Up	2023
Best PhD Forum Presentation Award, IPSN	2023
Rising Stars in CPS	2023
Rising Stars in EECS	2022
Nomination for Young Women in VLSI, TC/VLSI, IEEE Computer Society	2022
Best Paper Award, CNSM	2021
Graduate Student Fellowship, Dept. of CSE, UCSD	2018
Excellent Graduate Student, School of EECS, PKU	2018
First Prize in Oral Presentation of Undergraduate Research, School of EECS, PKU	2017
Award for Outstanding Research Performance in GREAT Program, UC Davis	2017
Merit Student, PKU	2017, 2016

## JOURNAL ARTICLES

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- J4. F. Asgarinejad, **X. Yu**, D. Jiang, J. Morris, T. Rosing, B. Aksanli, "Enhanced Noise-Resilient Pressure Mat System based on Hyperdimensional Computing", *MDPI Sensors*, 2024
- J3. **X. Yu**, K. Ergun, X. Song, L. Cherkasova, T. Rosing, "Automating and Optimizing Reliability-Driven Deployment in Energy-Harvesting IoT Networks", *IEEE Transactions on Network Services and Management (TNSM)*, vol. 20, no. 1, pp. 787-799, 2022
- J2. **X. Yu**, K. Ergun, L. Cherkasova, T. Rosing, "Optimizing Sensor Deployment and Maintenance Costs for Large-Scale Environmental Monitoring", *IEEE Transactions on Computer Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 39, no. 11, pp. 3918-3930, 2020
- J1. D. Fong, **X. Yu**, J. Mao, M. Saffarpour, R. Abueshsheikh, P. Gupta, A. V. Alcantar, E. Kurzrock, S. Ghiasi, "Restoring the Sense of Bladder Fullness for Spinal Cord Injury Patient", *Smart Health*, vol. 9, pp. 12-22, 2018

## CONFERENCE PROCEEDINGS

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- C12. **X. Yu**, A. Thomas, I. Gomez Moreno, L. Gutierrez, T. Rosing, "Lifelong Intelligence beyond the Edge using Hyperdimensional Computing", *ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)*, 2024
- C11. Q. Zhao, **X. Yu**, S. Hu, T. Rosing, "MultimodalHD: Federated Learning over Heterogeneous Sensor Modalities using Hyperdimensional Computing", *Design, Automation, and Test in Europe Conference (DATE)*, 2024
- C10. **X. Yu**, T. Rosing, Y. Guo, "Evolve: Enhancing Unsupervised Continual Learning with Multiple Experts", *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2024
- C9. I. Gomez Moreno, **X. Yu**, T. Rosing, "KalmanHD: Robust On-Device Time Series Forecasting with Hyperdimensional Computing", *Asia and South Pacific Design Automation Conference (ASP-DAC)*, 2024

- C8. **X. Yu**, L. Cherkasova, H. Vardhan, Q. Zhao, E. Ekaireb, X. Zhang, A. Mazumdar, T. Rosing, "Async-HFL: Efficient and Robust Asynchronous Federated Learning in Hierarchical IoT Networks", *ACM/IEEE International Conference on Internet of Things Design and Implementation (IoTDI)*, 2023
- C7. J. Liu, **X. Yu**, T. Rosing, "Self-Train: Self-Supervised On-Device Training for Post-Deployment Adaptation", *IEEE International Conference on Smart Internet of Things (SmartIoT)*, 2022
- C6. **X. Yu**, W. Xu, L. Cherkasova, T. Rosing, "Automating Reliable and Fault-Tolerant Design of LoRa-based IoT Networks", *International Conference on Network and Service Management (CNSM)*, 2021
- C5. Y. Guo, **X. Yu**, K. Chaudhuri, T. Rosing, "Active Sampling for Distributed Training in Heterogeneous Sensor Networks", *IEEE International Conference on Mobility, Sensing and Networking (MSN)*, 2020
- C4. **X. Yu**, X. Song, L. Cherkasova, T. Rosing, "Reliability-Driven Deployment in Energy-Harvesting Sensor Networks", *International Conference on Network and Service Management (CNSM)*, 2020
- C3. K. Ergun, **X. Yu**, N. Nagesh, L. Cherkasova, P. Mercati, R. Ayoub, T. Rosing, "Simulating Reliability of IoT Networks with RelIoT", *IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)*, 2020
- C2. K. Ergun, **X. Yu**, N. Nagesh, L. Cherkasova, P. Mercati, R. Ayoub, T. Rosing, "RelIoT: Reliability Simulator for IoT Networks", *International Conference on Internet of Things (ICIOT)*, 2020
- C1. **X. Yu**, R. Yu, J. Yang, X. Duan, "A Robotic Auto-Focus System based on Deep Reinforcement Learning", *International Conference on Control, Automation, Robotics and Vision (ICARCV)*, 2018

#### WORKSHOP PAPERS

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- W4. Q. Zhao, A. Thomas, A. Brin, **X. Yu**, T. Rosing, "Unleashing Hyperdimensional Computing with Nyström Method based Data Adaptive Encoding", *NeurIPS Workshop on ML with New Compute Paradigms (MLNCP)*, 2023
- W3. A. Redding, **X. Yu**, S. Hu, P. Pannuto, T. Rosing, "EmbHD: A Library for Hyperdimensional Computing Research on MCU-Class Devices", *MobiCom Workshop on Networked Sensing Systems for a Sustainable Society (NET4us)*, 2023
- W2. **X. Yu**, Y. Guo, S. Gao, T. Rosing, "SCALE: Online Self-Supervised Lifelong Learning without Prior Knowledge", *CVPR Workshop on Continual Learning (CLVision)*, 2023
- W1. E. Ekaireb, **X. Yu**, K. Ergun, Q. Zhao, K. Lee, M. Huzaifa, T. Rosing, "ns3-fl: Simulating Federated Learning with ns-3", *Workshop on ns-3 (WNS3)*, 2022

#### POSTERS, DEMOS AND OTHER PUBLICATIONS

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- P4. **X. Yu**, M. Zhou, F. Asgarinejad, O. Gungor, B. Aksanli, T. Rosing, "Lightning Talk: Private and Secure Learning at the Edge with Hyperdimensional Computing", *Design Automation Conference (DAC)*, 2023
- P3. **X. Yu**, "PhD Forum Abstract: Intelligence beyond the Edge in IoT", *ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)*, 2023
- P2. Q. Zhao, **X. Yu**, T. Rosing, "Attentive Multimodal Learning on Sensor Data using Hyperdimensional Computing", *ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)*, 2023
- P1. Q. Zhao, K. Lee, J. Liu, M. Huzaifa, **X. Yu**, T. Rosing, "FedHD: Federated Learning with Hyperdimensional Computing", *ACM Annual International Conference on Mobile Computing And Networking (MobiCom)*, 2022

#### EDUCATION

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<b>Ph.D., Computer Science and Engineering.</b> University of California, San Diego, CA, USA Advisor: Tajana Šimunić Rosing	2024 (expected)
<b>M.S., Computer Science and Engineering</b> University of California, San Diego, CA, USA	June 2020
<b>B.S., Electronics Engineering</b> Peking University, Beijing, China	July 2018

**Non-Degree Academic Experiences:**

Global Research Experience in Advanced Technologies (GREAT) Program  
University of California, Davis, CA, USA  
Advisor: Soheil Ghiasi

2017

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**TEACHING EXPERIENCES**

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**Teaching Assistant** at Dept. of CSE, UCSD  
CSE237A Introduction to Embedded Computing  
Instructor: Tajana Šimunić Rosing

Winter 2022, Winter 2023

**Teaching Assistant** at School of EECS, Peking University  
Emerging Techniques for Modern Wireless Communications  
Instructor: Lingyang Song

Spring 2018

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**INDUSTRIAL INTERNSHIPS**

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**Arm Research** (Remote Internship), San Jose, CA, USA  
Mentor & Manager: Ludmila Cherkasova & Gary Carpenter  
Project: Asynchronous Federated Learning in Hierarchical IoT Networks

Summer 2021

**Arm Research** (Remote Internship), San Jose, CA, USA  
Mentor & Manager: Ludmila Cherkasova & Gary Carpenter  
Project: Automating Robust and Fault-Tolerant LoRa-based IoT Networks Design

Summer 2020

**Kolmostar Inc.**, Fremont, CA, USA  
Manager: Wensheng Hua  
Project: Firmware update for ultra-low power GNSS module and module tests automation

Summer 2019

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**INVITED TALKS**

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*Mitigating Network and Modality Heterogeneities in Federated Learning for IoT Applications*, PKU  
*A Brief Introduction to Internet of Things*, Data Science Discovery Bootcamp, UCSD

March 2024

July 2023

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**SERVICE**

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**Technical Program Committee:** GOODIT'24

**Conference Reviewer:** ECCV'24, WACV'24

**Journal Reviewer:**

IEEE Transactions on Mobile Computing (TMC)

IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)

IEEE Transactions on Signal and Information Processing over Networks (TSIPN)

IEEE Transactions on Computational Imaging (TCI)