

Zhonghao Chen  
University of California, Merced, CA 95343  
E-mail: zchen122@ucmerced.edu | Tel: (209)-504-3779

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## Education

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**University of Florida**, Gainesville, FL, U.S.  
Ph.D. in ECE, Advisor: Prof. Xiaoyi Lu

*Jan. 2026 -*

**University of California, Merced**, Merced, CA, U.S.  
Ph.D. in EECS, Advisor: Prof. Xiaoyi Lu  
(Transferring to University of Florida in Jan. 2026)

*Aug 2024 - Dec 2025*

**Tianjin University**, Tianjin, Tianjin, China  
B.E. (with Honors), Computer Science and Technology

*September 2020 - July 2024*

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## Research Interests

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High-performance computing and networking; runtime and communication systems; scalable training and inference of large language models; distributed and federated learning systems; AI-HPC co-design and convergence for efficient large-scale machine learning.

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## Research Experience

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• **Reproduction and Characterization of Large Reasoning Models on HPC**

**University of California, Merced**, Advisor: Prof. Xiaoyi Lu

*December 2024 -*

- Investigate inference and distillation performance of large reasoning models (e.g., dense Llama-70B, MoE DeepSeek-R1-671B, Kimi-K2-1T) on HPC-scale GPU clusters (NVIDIA, AMD, Intel, etc.) and interconnects (Slingshot, InfiniBand).
- Employ parallelisms including Data, Tensor, Pipeline, and Expert, together with prefill-decode disaggregation, KV-cache transfer engines etc., to scale model deployment up to 3,840 GPUs.
- Analyze pipeline imbalance, communication overhead, and KV-cache bottlenecks limiting throughput and concurrency; identify optimal GPU and cluster configurations for scalable inference and provide system-level insights for AI-HPC co-design.
- Using Python, C/C++, and CUDA for building high-performance distributed ML systems, MPI/NCCL for communication, DeepSpeed/Megatron, vLLM, VeRL, Ray for LLM parallelism, and PyTorch Profiler, Nsight system for performance profiling.
- Ongoing project; partial results published at SC '25.

• **Scalable and Resilient Federated Learning**

**University of California, Merced**, PI: Prof. Xiaoyi Lu

*July 2024 -*

- Design a scalable and fault-tolerant modeling and simulation framework for complex federated learning (FL) workflows across cross-silo and cross-device scenarios under diverse networking conditions.
- Develop a discrete-event simulator on SimGrid that abstracts FL training, communication, and aggregation into lightweight data-plane events, and models heterogeneous compute and network resources using logs, traces, and microbenchmarks.
- Implement a communication-centric state machine to support synchronous, asynchronous, and semi-asynchronous aggregation, enabling systematic comparison of FL strategies.
- Build a user-space, MPI-level long-haul RDMA simulator with rate limiting and distance-based propagation delay modeling to compare RDMA and TCP/IP for geo-distributed FL workloads, offering practical guidance for real-world long-haul deployment.
- Compare RDMA and TCP/IP for FL workloads, and verify on real-world long-haul RDMA from Berkley, CA to Chicago, IL upon ESNet testbed
- Ongoing project; partial results published at SEC '25, SC '25.

## Publications

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- [1] [SEC'25] **Zhonghao Chen**, Weicong Chen, Duo Zhang, Kibaek Kim, Guanpeng Li, Sheng Di, and Xiaoyi Lu. “FedDES: Discrete Event Based Performance Simulation for Federated Learning Systems”. In: *The Tenth ACM/IEEE Symposium on Edge Computing (SEC)*. IEEE. 2025.
- [2] [SC'25] (Best Research Poster Candidate) **Zhonghao Chen**, Yuke Li, Duo Zhang, and Xiaoyi Lu. “Can Long-Haul RDMA Benefit Federated Learning?” In: *SC25: International Conference for High Performance Computing, Networking, Storage and Analysis*. IEEE. 2025.
- [3] [SC'25] Adam Weingram, Duo Zhang, **Zhonghao Chen**, Hao Qi, and Xiaoyi Lu. “HPC-R1: Characterizing R1-like Large Reasoning Models on HPC”. In: *SC25: International Conference for High Performance Computing, Networking, Storage and Analysis*. IEEE. 2025.
- [4] Jitao Bai, **Zhonghao Chen**, Simiao Zhang, and Jiahe Liang. “Building form optimization for renewable energy-economic utility of flexible solar cells as building integrated photovoltaics”. In: *Sustainable Cities and Society* 133 (2025), p. 106819. ISSN: 2210-6707. DOI: <https://doi.org/10.1016/j.scs.2025.106819>. URL: <https://www.sciencedirect.com/science/article/pii/S2210670725006924>.
- [5] Jitao Bai, Keyong Yang, **Zhonghao Chen**, Jiahe Liang, Simiao Zhang, and Yu Diao. “Geometry and Material Criteria for Low-Carbon Design of I/H-Beams in Sustainable Steel Structures Considering Both Mechanical Properties and Carbon Emissions”. In: *Materials* 18.21 (2025). ISSN: 1996-1944. DOI: 10.3390/ma18214930. URL: <https://www.mdpi.com/1996-1944/18/21/4930>.
- [6] **Zhonghao Chen**. “Deep Learning Techniques for EEG-Based BCI: Analysis and Applications”. In: *2023 16th International Congress on Image and Signal Processing, BioMedical Engineering and Informatics (CISP-BMEI)*. Oct. 2023, pp. 1–7. DOI: 10.1109/CISP-BMEI60920.2023.10373270.
- [7] Longlong Cheng, **Zhonghao Chen**, Ye Tian, Yuan Ding, and Shanjiang Tang. *An algorithm and system design of Deep Learning based edge-cloud scheduling for neuro-electrophysiological signals*. June 2023.
- [8] Ying Zhang, Jitao Bai, Yu Diao, **Zhonghao Chen**, Chu Wang, Kun Yang, Zeng Gao, and Huajie Wei. “Risk and Energy Based Optimization for Fire Monitoring System in Utility Tunnel Using Cellular Automata”. In: *Sustainability* 16.11 (2024), p. 4717.
- [9] Jitao Bai, Simiao Zhang, and **Zhonghao Chen**. *Is There Any Social Principle for LLM-Based Agents?* 2023. arXiv: 2308.11136 [cs.CY]. URL: <https://arxiv.org/abs/2308.11136>.

## Professional Experience

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1. **NXP Semiconductors**, Tianjin, Tianjin, China  
Software Engineer Intern - GUI Development April 2023 - June 2023
2. **Tianjin University Software Studio(TWT)**, Tianjin, Tianjin, China  
Software Engineer Intern - iOS Backend Development November 2020 - May 2021

## Honors, Awards and Activities

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- Student Travel Grant Q-CORE @ QCE 2025 August 2025
- B.E. with honors July 2024
- Talent Student in Scientific and Technological Research September 2023
- The 7<sup>th</sup> Undergraduate Integrated Circuits Innovation and Entrepreneurship Competition June 2023
- Member, Undergraduate Academic Committee September 2020 – July 2021