# Eric (Ding) Ding

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## EDUCATION

**Cornell University** — Ithaca, NY, United States
*Ph.D., Computer Science, Direction: Systems and Networking* — *Aug. 2024 – Present*

**University of Michigan** — Ann Arbor, MI, United States
*B.S.E., Computer Science, Summa Cum Laude, GPA: 3.96, Dual Degree Program* — *Aug. 2022 – Apr. 2024*

**Shanghai Jiao Tong University** — Shanghai, China
*B.S.E., Electrical and Computer Engineering, Outstanding Graduate, GPA: 3.76, top 10%* — *Sep. 2020 – Aug. 2024*

## RESEARCH EXPERIENCE

**Graduate Student Researcher** — Ithaca, New York
*Cornell University* — *Aug. 2024 – Present*

- Developing a control plane for software-defined optical interconnect to reduce large language model (LLM) inference latency.

**Machine Learning System Research Assistant** — Ann Arbor, MI, United States
*SymbioticLab, University of Michigan* — *May 2023 – Apr. 2024*

- Developed *Propius*, a Federated Learning (FL) resource management system, based on a microservice architecture.
- Built and deployed a distributed FL evaluation framework in GPU clusters, supporting multi-job parallel training.
- Implemented *Venn*, an advanced scheduling policy, in *Propius* that improves the average FL job completion time by up to 1.88x compared to random allocation.
- Contributed to open-source project *FedScale*, the largest benchmark for FL, in adaptive FL optimizer implementation.

**Embedded System Research Assistant** — Ann Arbor, MI, United States
*The Fan Lab, University of Michigan* — *May 2023 – Sep. 2023*

- Developed *WASP*, a wireless wearable device, capable of monitoring sweat for early disease detection.
- Designed a reliable communication protocol that operates atop I2C and Bluetooth Low Energy protocols, ensuring high-fidelity data communication between two in-device microcontrollers and a terminal microcontroller.

**Machine Learning Theory Research Assistant** — Shanghai, China
*John Hopcroft Center, Shanghai Jiao Tong University* — *Sep. 2021 – Mar. 2022*

- Studied, implemented, and theoretically analyzed Non-Contrastive Self-Supervised Learning (SSL) algorithms.
- Conducted experiments, and compared the performances of Non-Contrastive SSL and traditional Supervised Learning, showing the robustness of SSL methods on imbalanced datasets with long-tail distribution.

## WORK EXPERIENCE

**Artificial Intelligence Internship** — Shanghai, China
*Bosch* — *May 2024 – Aug. 2024*

- Designed and implemented a software system leveraging OpenAI endpoints and Neo4J graph database for information retrieval and domain-specific task reasoning.
- Deployed the system on Microsoft Azure for internal use, achieving an estimated 30% reduction in business costs.

## PUBLICATION

- Jiachen Liu, Fan Lai, **Ding Ding**, Yiwen Zhang, Mosharaf Chowdhury, Venn: Resource Management Across Federated Learning Jobs, arXiv (arXiv:2312.08298)

- Anjali Devi Sivakumar, Ruchi Sharma, Chandrakalavathi Thota, **Ding Ding**, Xudong Fan, WASP: Wearable Analytical Skin Probe for Dynamic Monitoring of Transepidermal Water Loss, ACS Sensors 2023.

## Volunteering and Activities

**Computer Science Peer Tutor**                                      Ann Arbor, MI, United States
*Renew CS Program, School of Information, University of Michigan*                  *Feb. 2024 - May. 2024*
- Providing weekly group and individual tutoring sessions for EECS 280 Programming and Data Structures.

**Electrical Engineer**                                                          Shanghai, China
*Shanghai Jiao Tong University Racing Team*                                      *Mar. 2021 - Aug. 2022*
- Designed a carbon fiber dashboard using Catia, integrated ignition and fire extinguisher switches with the dashboard.
- Configured low-voltage electrical system wiring, and updated wire connectors for new electronic control units (ECU).
- Helped our team to win national second prize of 2021 Formula Student Combustion China.

## Projects

**A Fully Synthesizable Out-of-Order RISC-V Processor** | *SystemVerilog, Verdi*
- Designed an out-of-order processor with features including: RISC-V R10k style register renaming scheme, N-way superscalar, load/store queue, tournament branch predictor, and non-blocking cache.
- Wrote the processor and a complete set of testcases in SystemVerilog, used Verdi platform for debugging and verification.

**CNN Convolution Optimization** | *CUDA, Slurm*
- Optimized forward convolution layer computation in CUDA, adopting parallel programming techniques, such as memory coalescing, shared memory multiplication and loop unrolling.
- Achieved a processing time of 0.079 seconds for large batches (10K $33 \times 33 \times 12$ images with 24 filters).

**Simplified Operating System Kernel** | *C++*
- Developed a CPU scheduler and a thread library, supporting thread allocation, interruption, and synchronization primitives, such as mutex and conditional variables.
- Developed a pager which manages processes' virtual address spaces, and swap-backed and file-backed pages across physical memory and disk. Built a multi-threaded network file server in UNIX file system hierarchy.

**Distributed Search Engine** | *Python, React, AWS*
- Developed a fault-tolerant distributed system running MapReduce framework. Created segmented inverted indexes of web pages through a MapReduce pipeline that is compatible with Hadoop Streaming.
- Implemented a distributed backend index service, capable of generating customized search results via PageRank and TF-IDF integration, and a scalable frontend search server.

## Grants and Awards

- Graduate School Fellowship, Cornell University, Feb. 2024
- James B. Angell Scholar, University of Michigan, Feb. 2024
- University Honors, University of Michigan, Dec. 2023, Apr. 2023, Dec. 2022
- Dean's List, University of Michigan, Dec. 2023, Apr. 2023, Dec. 2022
- Tang Junyuan JI Scholarship Nominee, Aug. 2022
- Shanghai Jiao Tong University Merit Student Award, Nov. 2021

## Technical Skills

**Languages**: C++, Python, C, SystemVerilog, Go, RISC-V, Matlab, Javascript, Bash, SQL, R
**Frameworks**: PyTorch, CUDA, Tensorflow, React, gRPC, Hadoop, LangGraph
**Developer Tools**: Git, Docker, Kubernetes, Redis, Neo4J, Cloudflare, AWS, Azure, LaTeX, VSCode, Arduino, STM32CubeIDE, Wireshark
**Simulation and Modeling**: Verdi, Catia, Matlab, Mathematica, LabVIEW, Pspice, Proteus, Vivado