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# Ding (Eric) Ding

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## EDUCATION

### University of Michigan

B.S.E., Computer Science, GPA: 3.96, Dual Degree Program

Ann Arbor, MI, United States

Apr. 2024

### Shanghai Jiao Tong University

B.S.E., Electrical and Computer Engineering, GPA: 3.76, top 10%

Shanghai, China

Aug. 2024

## RESEARCH

### Machine Learning System Research Assistant

*SymbioticLab, University of Michigan*

Advisor: Mosharaf Chowdhury, Fan Lai

May 2023 - Present

- 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 an advanced scheduling policy, *Venn*, in *Propius* that reduces the average FL job completion time by 88% compared to random allocation.
- Contributed to open-source project *FedScale*, the largest benchmark for FL, in adaptive FL optimizer implementation.

### Embedded System Research Assistant

*The Fan Lab, University of Michigan*

Advisor: Xudong Fan

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.

### AI Safety Researcher

*Michigan AI Safety Initiative*

Advisor: Jakub Kraus

Sep. 2022 - Dec. 2022

- Participated in a seminar series with a focus on the challenges of aligning advanced AI systems with human values.
- Built and trained a Reinforcement Learning model based on the Q-learning method to automate a virtual taxi.
- Analyzed cheating behaviors of RL taxi agents with defined objectives, and proposed a solution using Inverse Reinforcement Learning techniques.

### Machine Learning Theory Research Assistant

*John Hopcroft Center, Shanghai Jiao Tong University*

Advisor: Shuai Li

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.

## PUBLICATIONS

- Jiachen Liu, Fan Lai, **Ding Ding**, Yiwen Zhang, Mosharaf Chowdhury, *Venn: Resource Management Across Federated Learning Jobs*, MLSys 2024. (Under Review), 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

### Electrical Engineer

*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.

## Mathematical Contest in Modeling Project Team Leader

UM-SJTU Joint Institute May 2022

- Led a team to evaluate an urban fire alarm system by building a machine learning and data analysis pipeline.
- Constructed a dataset from various alarm sensor logs. Achieved an 85.7% top-1 accuracy in predicting false alarms through deep neural network training on the dataset.
- Evaluated fire alarm subsystems across different city districts using a gray comprehensive evaluation model, and optimized the allocation of limited firefighting resources.
- Our project won the first prize in the 2022 China May Day Mathematical Contest in Modeling.

## Student Instructor

UM-SJTU Joint Institute Sep. 2020 - Aug. 2022

- Organized bi-weekly sessions with fellow students, providing guidance on academic development in STEM and emotional well-being. Promoted student engagement by hosting social events.
- Honored with the Shanghai Jiao Tong University Merit Student Award in recognition of outstanding student services.

## Selected Projects

### CNN Convolution Optimization

EECS471 Applied Parallel Programming in GPUs, University of Michigan

- 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

EECS482 & EECS498 Operating Systems (6-credit), University of Michigan

- 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

EECS485 Web Systems, University of Michigan

- 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.
- Deployed the search engine in AWS.

## GRANTS AND AWARDS

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| • University Honors, University of Michigan . . . . .                               | Apr. 2023 |
| • Dean's List, University of Michigan . . . . .                                     | Apr. 2023 |
| • University Honors, University of Michigan . . . . .                               | Dec. 2022 |
| • Dean's List, University of Michigan . . . . .                                     | Dec. 2022 |
| • Tang Junyuan JI Scholarship Nominee . . . . .                                     | Aug. 2022 |
| • First Prize of 2022 China May Day Mathematical Contest in Modeling . . . . .      | May 2022  |
| • Shanghai Jiao Tong University Pu Yuan Future Talent Program Scholarship . . . . . | Jan. 2022 |
| • Shanghai Jiao Tong University Undergraduate Excellence Scholarship . . . . .      | Dec. 2021 |
| • Second Prize of Shanghai 2021 CUMCM Mathematical Contest in Modeling . . . . .    | Dec. 2021 |
| • Shanghai Jiao Tong University Merit Student Award . . . . .                       | Nov. 2021 |

## Skills

**Language:** C++, Python, C, Matlab, Verilog, React/JS, Bash, SQL, R

**Framework:** PyTorch, CUDA, gRPC, Hadoop

**Tools:** Docker, Git,  $\LaTeX$ , VSCode, Arduino, STM32CubeIDE, Wireshark

**Simulation and Modelling:** Catia, Matlab, Mathematica, LabVIEW, Pspice, Proteus, Vivado