

Dayi Fan

PERSONAL INFO

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RESEARCH INTEREST

My research focuses on parallel computing, algorithm engineering, and scalable data systems. Specifically, I design novel parallel algorithms and develop hardware-aware implementations on multicore CPUs and GPUs to accelerate irregular workloads across graph analytics, database systems, and other data-intensive applications. My work has produced state-of-the-art parallel solutions for several fundamental problems: tree edit distance, graph maximum matching, and bipartite weighted matching.

My future research agenda also extends to ML systems and AI-guided programming. I am particularly interested in developing LLM-based multi-agent frameworks for parallel programming, where multiple agents collaborate on algorithm design, code generation, correctness validation, and benchmark-driven performance optimization. More broadly, I aim to develop systems that automatically explore data structures, parallel strategies, and hardware-specific optimizations in response to changing workloads, platforms, and application objectives. My long-term research vision is to make computing systems more automatic, adaptive, and resource-efficient.

EDUCATION

2022.01-2026.12 (expected)	Ph.D. Candidate in Computer Science and Engineering, The Ohio State University Advisor: Prof. Xiaodong Zhang Theme: Parallel Algorithm Design and Hardware Acceleration for Irregular Data-Centric Applications
2021.01-2021.05	Undergraduate Exchange Student in Computer Science, National University of Singapore Project: LSTM Implementation with Spiking Neural Networks

PUBLICATIONS

- 2026 **X-Wim: Massive Parallelization of Weighted Matching in Bipartite Graphs**
Dayi Fan, Simon Zhang, Rubao Lee, Hanqi Guo, Xiaodong Zhang
Proceedings of the VLDB Endowment (VLDB 2026) [[PDF](#)][[Code](#)]
- The first scalable parallel framework for bipartite weighted matching, a fundamental problem in user paring, object tracking, and entity resolution
 - Introduces a new phase-decoupled Hungarian algorithm that breaks the tight interleaving between path search and label updates, enabling massive search concurrency while substantially reducing synchronization
 - Outperforms state-of-the-art baselines by up to 10x on one core and scales to 96 cores with an average 1.7x speedup per thread doubling
- 2025 **X-Blossom: Massive Parallelization of Graph Maximum Matching**
Dayi Fan, Rubao Lee, Xiaodong Zhang
Proceedings of the VLDB Endowment (VLDB 2025) [[PDF](#)][[Code](#)]
- The first scalable parallel framework for maximum matching, a critical primitive in graph databases, network scheduling, and service dispatch
 - Proposes a new recursion-free Blossom algorithm that eliminates dynamic graph contraction, thereby removing strong recursive dependencies and exposing massive parallelism
 - Surpasses prior state-of-the-art matching solutions significantly, achieving speedups of up to three orders of magnitude
- 2024 **X-TED: Massive Parallelization of Tree Edit Distance**
Dayi Fan, Rubao Lee, Xiaodong Zhang
Proceedings of the VLDB Endowment (VLDB 2024) [[PDF](#)][[Code](#)]
- The first scalable parallel framework for tree edit distance, with broad applications including code analysis and LLM output evaluation
 - Develops a new algorithm that infers intricate data dependencies among dynamic-programming tables from input tree structures with negligible overhead and batches independent tables for concurrent processing
 - Achieves speedups of up to 31x over prior parallel solutions

2024 **RR-Compound: RDMA-Fused gRPC for Low Latency, High Throughput, and Easy Interface**

Liang Geng, Hao Wang, Jingsong Meng, **Dayi Fan**, Sami Ben-Romdhane, Hari Kadayam Pichumani, Vinay Phegade, Xiaodong Zhang

IEEE Transactions on Parallel and Distributed Systems (TPDS 2024) [[PDF](#)][[Code](#)]

- Integrates RDMA into gRPC with hybrid connection management and preallocated buffers to reduce latency and improve throughput

MANUSCRIPTS

2026 **Veray: A Language for Repurposed Ray Tracing**

Rubao Lee, Ash Li, Liang Geng, **Dayi Fan**, Xiaodong Zhang

Submitted to CGO 2027

2026 **Performance Insights and Implications of Traversal-based Graph Analytics on both Multi-core CPUs and GPUs**

Jiaxin Liu, **Dayi Fan**, Rubao Lee, Cathy Xia, Xiaodong Zhang

INVITED TALKS

Aug 31, 2026 **Massive Parallelization of Irregular Computations:
Parallel Algorithm Design and Hardware Acceleration** [[Talk](#)]
MIT Computer Science and Artificial Intelligence Laboratory (CSAIL)
Cambridge, MA · Room 32-G575 · 2:00–3:00 PM
Hosted by Prof. Julian Shun

ACADEMIC SERVICE

2027 Shadow Program Committee Member, VLDB 2027

2026 Session Chair, VLDB 2026 — *Scalable Graph Algorithms*

2026 Reviewer, The Journal of Supercomputing

EXPERIENCE

- 2022.01-CURRENT Graduate Research Associate
The Ohio State University
- 2022.01-2024.05 Graduate Teaching Associate
The Ohio State University
CSE 3421 Computer Architecture
OSU C4 Oral English Proficiency Certification

SKILLS

Programming Languages: C++, CUDA, Python, Java

Databases: PostgreSQL, MySQL

Machine Learning: PyTorch, Hugging Face, OpenEvolve

Systems/HPC: Multithreading, GPU Programming, System Profiling, gRPC, RDMA

ACADEMIC PERFORMANCE

Postgraduate GPA: 3.96/4.00

Undergraduate GPA: 3.90/4.00

2021.06 Excellent Graduation Award
Southern University of Science and Technology

2017-2020 First Class Student Scholarship (Top 5%, three consecutive years)
Southern University of Science and Technology