Dayi Fan

Personal Info

Email: fan.1090@osu.edu
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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 research vision is to make computing systems more automatic, adaptive, and resource-efficient.

Education

2022.01-2027.05 (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

2017.09-2021.07
B.Eng. in Microelectronics Science and Engineering,
Southern University of Science and Technology

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 10× on one core and scales to 96 cores with an average 1.7× 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 992×

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 31× 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

Papers in Submission

2026 Vert: A Language for Repurposed Ray-Tracing Applications
Rubao Lee, Ash Li, Liang Geng, **Dayi Fan**, Xiaodong Zhang
Submitted to PLDI 2027

2026 Performance Insights and Architectural Implications of Graph Data Processing
Jiaxin Liu, **Dayi Fan**, Rubao Lee, Cathy Xia, Xiaodong Zhang
Submitted to ICDE 2027

2026 Re-RTBench: A Repurposed Ray Tracing Core Benchmark Suite for System Insights and Performance Characterization
Jiaxin Liu, **Dayi Fan**, Liang Geng, Rubao Lee, Cathy Xia, Xiaodong Zhang
Submitted to SIGMETRICS 2027

2026 RayMesh: Fast and Scalable 3D Mesh Watertightness Verification via Ray Tracing Hardware
Zhixiong Xiao, **Dayi Fan**, Liang Geng, Jiaxin Liu, Rubao Lee, Xiaodong Zhang
Submitted to ICS 2027

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

Conference Presentations

2026 X-Wim: Massive Parallelization of Weighted Matching in Bipartite Graphs
VLDB 2026, Boston, U.S. [Video]

2025 X-Blossom: Massive Parallelization of Graph Maximum Matching
VLDB 2025, London, U.K. [Video]

2024 X-TED: Massive Parallelization of Tree Edit Distance
VLDB 2024, Guangzhou, China [Video]

Academic Service

2027 Program Committee Member, ACM SIGMOD 2027

2027 Program Committee Member, VLDB 2027 (Demonstration Track)

2027 Shadow Program Committee Member, VLDB 2027

2026 Session Chair, VLDB 2026

2026 Reviewer, World Wide Web

2026 Reviewer, Data Mining and Knowledge Discovery

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

Skills

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

Databases: PostgreSQL, MySQL

Machine Learning: PyTorch, Hugging Face, OpenEvolve, Multi-agent Framework

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

Academic Performance

Ph.D. GPA: 3.96/4.00

2021.06 Excellent Graduation Award
Southern University of Science and Technology

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