

Liangyu Zhao

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Website: <https://liangyuzhao.me/>

Research Interests Machine learning systems, distributed systems, collective communications; broadly speaking, I am interested in formulating and solving mathematical problems in computer systems and networking.

Education **University of Washington** Seattle, WA
Ph.D. in Computer Science 2021 – Present
Direction: Systems & Networking
Advisor: Prof. Arvind Krishnamurthy

University of Washington Seattle, WA
M.S. in Computer Science (unfinished) 2020 – 2021

University of Washington Seattle, WA
B.S. in Computer Science,
B.S. in Applied & Computational Mathematical Sciences
(Discrete Math and Algorithms track) 2015 – 2020

Industry Experience **Microsoft Research**, Research in Software Engineering (RiSE) Redmond, WA
Part-Time Researcher Summer 2024 – Present

Microsoft Research, Research in Software Engineering (RiSE) Redmond, WA
Research Intern Summer 2023
Mentor: Saeed Maleki
Optimizing collective communications on machine learning GPUs (e.g., NVIDIA DGX A100, AMD MI250).

ByteDance, AI-Lab Bellevue, WA
Research Intern, ML System Summer 2020
Mentor: Yibo Zhu
Working on automatic learning-rate schedule.

Microsoft, Azure Compute Core Redmond, WA
Software Engineer Intern Autumn 2019

Google, Ads Infra Mountain View, CA
Software Engineer Intern Summer 2019

Microsoft, Azure Compute Core Redmond, WA
Software Engineer Intern Summer 2018

Publications

ForestColl: Efficient Collective Communications on Heterogeneous Network Fabrics

Liangyu Zhao, Saeed Maleki, Aashaka Shah, Ziyue Yang, Hossein Pourreza,
Arvind Krishnamurthy

arXiv preprint, in submission

NanoFlow: Towards Optimal Large Language Model Serving Throughput

Kan Zhu, Yilong Zhao, **Liangyu Zhao**, Gefei Zuo, Yile Gu, Dedong Xie,
Yufei Gao, Qinyu Xu, Tian Tang, Zihao Ye, Keisuke Kamahori, Chien-Yu Lin,
Stephanie Wang, Arvind Krishnamurthy, Baris Kasikci

arXiv preprint, in submission

Efficient Direct-Connect Topologies for Collective Communications

Liangyu Zhao, Siddharth Pal, Tapan Chugh, Weiyang Wang, Jason Fantl,
Prithwish Basu, Joud Khoury, Arvind Krishnamurthy

USENIX Symposium on Networked Systems Design and Implementation (NSDI '25)

*Rethinking Machine Learning Collective Communication as a Multi-Commodity
Flow Problem*

Xuting Liu, Behnaz Arzani, Siva Kesava Reddy Kakarla, **Liangyu Zhao**, Vin-
cent Liu, Miguel Castro, Srikanth Kandula, Luke Marshall

ACM Special Interest Group on Data Communication (SIGCOMM '24)

Efficient all-to-all Collective Communication Schedules for Direct-connect Topologies

Prithwish Basu, **Liangyu Zhao**, Jason Fantl, Siddharth Pal, Arvind Krishna-
murthy, Joud Khoury

*International Symposium on High-Performance Parallel and Distributed Computing
(HPDC '24)*

AutoLRS: Automatic Learning-Rate Schedule by Bayesian Optimization on the Fly

Yuchen Jin, Tianyi Zhou, **Liangyu Zhao**, Yibo Zhu, Chuanxiong Guo, Marco
Canini, Arvind Krishnamurthy

International Conference on Learning Representations (ICLR '21)

Nexus: A GPU Cluster Engine for Accelerating DNN-Based Video Analysis

Haichen Shen, Lequn Chen, Yuchen Jin, **Liangyu Zhao**, Bingyu Kong, Matthai
Philipose, Arvind Krishnamurthy, Ravi Sundaram

ACM Symposium on Operating Systems Principles (SOSP '19)

Invited Talks

ForestColl: Efficient Collective Communications on Heterogeneous Network Fabrics

NLP Reading Group

NVIDIA

November, 2024

ForestColl: Efficient Collective Communications on Heterogeneous Network Fabrics
Paul G. Allen School Annual Research Showcase
University of Washington October, 2024

ForestColl: Efficient Collective Communications on Heterogeneous Network Fabrics
RiSE Weekly Meeting
Microsoft Research August, 2024

Automatic Generation of Collective Communication Algorithms: The Principles of ForestColl
ByteDance August, 2024

ForestColl: Efficient Collective Communications on Heterogeneous Network Fabrics
AMD Research July, 2024

Efficient Direct-Connect Topologies for Collective Communications
FOCI Annual Symposium
University of Washington October, 2023

Efficient Direct-Connect Topologies for Collective Communications
Harvard Cloud Networking and Systems Group
Harvard University July, 2023