

# Liangyu Zhao

**Email:** liangyu@cs.washington.edu

**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 Jul – Nov 2024

**Microsoft Research**, Research in Software Engineering (RiSE) Redmond, WA  
Research Intern Jun – Sep 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 Jul – Oct 2020  
Mentor: Yibo Zhu  
Working on automatic learning-rate schedule.

**Microsoft**, Azure Compute Core Redmond, WA  
Software Engineer Intern Sep – Dec 2019

**Google**, Ads Infra Mountain View, CA  
Software Engineer Intern Jun – Sep 2019

**Microsoft**, Azure Compute Core Redmond, WA  
Software Engineer Intern Jun – Aug 2018

**Zap Surgical Systems**  
Software Engineer Intern

San Carlos, CA  
Jun – Sep 2017

## 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**, Vincent 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 Krishnamurthy, 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*  
Distributed Systems Laboratory (DSL) Seminar  
University of Pennsylvania  
November, 2024

*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*

Future of Cloud Infrastructure (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