

Yang Zhou

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RESEARCH INTERESTS

Networked systems, distributed systems, high-performance networking stacks, application-kernel co-design, network measurement.

EDUCATION

Harvard University, Cambridge, MA

Ph.D. in Computer Science

Expected June 2024

M.S. in Computer Science

November 2021

Thesis: Co-Designing Networking Stack and μ s-Scale Applications for Efficiency and Performance

Advisors: Minlan Yu and James Mickens

Peking University, Beijing, China

B.S. in Computer Science

July 2018

Thesis: Towards Faster and More Accurate Data Stream Processing

Advisors: Tong Yang

WORK EXPERIENCE

Harvard University, Research Assistant

August 2018 - Present

- Accelerated Paxos operations in eBPF.
- Accelerated distributed in-memory transaction in eBPF.
- Designed load balancing schemes for microsecond-scale RPCs.
- Built SGX-like TEEs for NFs in SmartNICs under multi-tenant cloud environment.

Google NetInfra Group, System Research Group, Research Intern

June 2021 - May 2023

- Worked on fault tolerance for application-integrated far memory system. Proposed a span-based erasure coding scheme to encode different sizes of objects. Designed a RMA-based data-parity consistency protocol for swapping out spans.
- Worked on the efficient scheduling of microsecond tasks.

VMware Research, Research Intern

July 2020 - September 2020

- Accelerated geo-distributed data analytics and save WAN traffic cost, by applying traffic redundancy elimination (TRE) technique to data analytics jobs. Implemented under Alluxio, an in-memory data cache platform, to enable TRE when sending data across different data centers.

Facebook, Research Collaborator

November 2019 - May 2020

- Worked on Facebook change-aware network telemetry system. Proposed layering design along the data collection pipeline to tolerate changes. Incorporated cross-layer dependency in monitoring system to help troubleshooting.

SenseTime, Software Engineering Intern

March 2018 - May 2018

- Worked on Ceph setup, testing, maintenance, monitoring, and alerting.

Peking University, Research Assistant

April 2017 - July 2018

- Improved the accuracy and speed of approximate data stream processing for network measurements.

PUBLICATIONS

Total **742** citations till September 2024 based on Google Scholar.

Conference Publications

- [1] **Yang Zhou**, Zezhou Wang, Sowmya Dharanipragada, and Minlan Yu. “Electrode: Accelerating Distributed Protocols with eBPF”, *USENIX NSDI 2023*.
- [2] **Yang Zhou**, Hassan Wassel, Sihang Liu, Jiaqi Gao, James Mickens, Minlan Yu, Chris Kennelly, Paul Turner, David Culler, Hank Levy, and Amin Vahdat. “Carbink: Fault-Tolerant Far Memory”, *USENIX OSDI 2022*.
- [3] **Yang Zhou**, Ying Zhang, Minlan Yu, Guangyu Wang, Dexter Cao, Eric Sung, and Starsky Wong. “Evolvable Network Telemetry at Facebook”, *USENIX NSDI 2022*.
- [4] Tong Yang, Jie Jiang, Peng Liu, Qun Huang, Junzhi Gong, **Yang Zhou**, Rui Miao, Xiaoming Li, and Steve Uhlig. “Elastic Sketch: Adaptive and Fast Network-Wide Measurements”, *ACM SIGCOMM 2018*.
- [5] **Yang Zhou**, Tong Yang, Jie Jiang, Bin Cui, Minlan Yu, Xiaoming Li, and Steve Uhlig. “Cold Filter: A Meta-Framework for Faster and More Accurate Stream Processing”, *ACM SIGMOD 2018*.
- [6] Xiangyang Gou, Chenxingyu Zhao, Tong Yang, Lei Zou, **Yang Zhou**, Yibo Yan, Xiaoming Li, and Bin Cui. “Single Hash: Use One Hash Function to Build Faster Hash Based Data Structures”, *IEEE International Conference on Big Data and Smart Computing (BigComp) 2018*.
- [7] Omid Alipourfard, Masoud Moshref, **Yang Zhou**, Tong Yang, and Minlan Yu. “A Comparison of Performance and Accuracy of Measurement Algorithms in Software”, *ACM Symposium on SDN Research (SOSR) 2018*.
- [8] Tong Yang, **Yang Zhou**, Hao Jin, Shigang Chen, and Xiaoming Li. “Pyramid Sketch: A Sketch Framework for Frequency Estimation of Data Streams”, *International Conference on Very Large Data Bases (VLDB) 2017*.
- [9] **Yang Zhou**, Peng Liu, Hao Jin, Tong Yang, Shoujiang Dang, and Xiaoming Li. “One Memory Access Sketch: A More Accurate and Faster Sketch for Per-Flow Measurement”, *IEEE Global Communications Conference (Globecom) 2017*.
- [10] Junzhi Gong, Tong Yang, **Yang Zhou**, Dongsheng Yang, Shigang Chen, Bin Cui, and Xiaoming Li. “ABC: A Practicable Sketch Framework for Non-Uniform Multisets”, *IEEE International Conference on Big Data (BigData) 2017*.

Papers Under Reviews

- [11] **Yang Zhou**, Hassan Wassel, James Mickens, Minlan Yu, and Amin Vahdat. “Mew: Efficient Inter-Server Load Balancing for Microsecond-Scale RPCs”, in submission to *USENIX NSDI 2024*.
- [12] **Yang Zhou**, Xingyu Xiang, Matthew Kiley, Sowmya Dharanipragada, and Minlan Yu. “DINT: Fast In-Kernel Distributed Transactions with eBPF”, in submission to *USENIX NSDI 2024*.
- [13] **Yang Zhou**, Varun Gandhi, Mark Wilkening, James Mickens, and Minlan Yu. “NFShield: Securing NIC-Accelerated Network Functions in the Cloud”, in submission to *ACM EuroSys 2024*.

Workshop and Demo Publications

- [14] **Yang Zhou**, Hao Jin, Peng Liu, Haowei Zhang, Tong Yang, and Xiaoming Li. “Accurate Per-Flow Measurement with Bloom Sketch”, *IEEE International Conference on Computer Communications Workshops (INFOCOM WKSHPS) 2018*.

Journal Publications

- [15] Zhuochen Fan, Gang Wen, Zhipeng Huang, **Yang Zhou**, Qiaobin Fu, Tong Yang, Alex X Liu, and Bin Cui. “On the Evolutionary of Bloom Filter False Positives - An Information Theoretical Approach to Optimizing Bloom Filter Parameters”, *IEEE Transactions on Knowledge & Data Engineering* 2022.
- [16] Yuanpeng Li, Xiang Yu, Yilong Yang, **Yang Zhou**, Tong Yang, Zhuo Ma, and Shigang Chen. “Pyramid Family: Generic Frameworks for Accurate and Fast Flow Size Measurement”, *IEEE/ACM Transactions on Networking* 2021.
- [17] Tong Yang, Jie Jiang, **Yang Zhou**, Long He, Jinyang Li, Bin Cui, Steve Uhlig, and Xiaoming Li. “Fast and Accurate Stream Processing by Filtering the Cold”, *The VLDB Journal* 2019.
- [18] Tong Yang, Jie Jiang, Peng Liu, Qun Huang, Junzhi Gong, **Yang Zhou**, Rui Miao, Xiaoming Li, and Steve Uhlig. “Adaptive Measurements Using One Elastic Sketch”, *IEEE/ACM Transactions on Networking* 2019.
- [19] **Yang Zhou**, Omid Alipourfard, Minlan Yu, and Tong Yang. “Accelerating Network Measurement in Software”, *ACM SIGCOMM Computer Communication Review* 2018.

PRESENTATIONS

1. **Electrode: Accelerating Distributed Protocols with eBPF**

- ACE Center for Evolvable Computing April 2023
- USENIX NSDI, Boston, MA April 2023
- Duke University systems and networking seminar April 2023
- Google LLC April 2023
- Columbia University system lunch March 2023

2. **Carbink: Fault-Tolerant Far Memory**

- Cornell networked systems seminar November 2023
- WORDS Workshop, San Diego, CA November 2022
- USENIX OSDI, Carlsbad, CA July 2022
- Microsoft Research Redmond July 2022
- Google LLC June & March 2022

3. **Evolvable Network Telemetry at Facebook**

- USENIX NSDI, Seattle, WA April 2022
- Boston University March 2022
- Meta Platforms, Inc. March 2022

4. **SpeedUp: Accelerating Geo-distributed Data Analytics across the Enterprise**

- VMWare Research August 2020

MENTORING EXPERIENCE

- Zezhou Wang, Peking University undergraduate → University of Washington PhD 2022
Accelerating Paxos using eBPF (NSDI 2023, [1]).
- Xingyu Xiang, Peking University undergraduate 2023
Accelerating transaction processing using eBPF.
- Yunxi Shen, Tsinghua University undergraduate 2023
Resource-efficient job scheduling in data centers.
- Matt Kiley, Harvard College undergraduate 2023
Accelerating transaction processing using eBPF and AF_XDP-based RPC systems.

TEACHING EXPERIENCE

- **Teaching Assistant.** CS145 Networking at Scale, Prof. Minlan Yu, Harvard University Spring 2021
- **Teaching Assistant.** Algorithm Design and Analysis, Prof. Tong Yang, Peking University Fall 2018

PATENTS

1. **Yang Zhou**, Hassan Wassel, Minlan Yu, Hank Levy, David Culler, and Amin Vahdat. “Fault Tolerant Disaggregated Memory”. Pending, filed by Google LLC in December 2022.

ACADEMIC HONORS

- Google Ph.D. Fellowship in Systems and Networking 2022
- Finalist, Meta/Facebook Ph.D. Fellowship in Networking 2022
- Graduate Fellowship, Harvard University 2018
- Excellent Bachelor Thesis (10/327), School of EECS, Peking University 2018
- New Academic Star Award (1/193), School of EECS, Peking University 2018
- Exceptional Award for Academic Innovation (2/193), Peking University 2017
- Arawana Scholarship (2/193), Peking University 2017
- Merit Student Honor, Peking University 2017
- Pinyou Hudong Scholarship, School of EECS, Peking University 2016
- May Fourth Scholarship, Peking University 2015
- Academic Improvement Honor, Peking University 2015

PROFESSIONAL ACTIVITIES

- Technical Program Committee Member: *ACM SIGCOMM Poster/Demo 2023, IEEE INFOCOM Workshop on Networking Algorithms 2020.*
- Reviewer (Conferences): *ACM SIGKDD 2023, IEEE INFOCOM Workshop 2020.*
- Reviewer (Journals): *ACM Transactions on Modeling and Performance Evaluation of Computing Systems, IEEE/ACM Transactions on Networking, IEEE Journal on Selected Areas in Communications, IEEE Communications Letters, IEEE Transactions on Network and Service Management, IEEE Transactions on Vehicular Technology, IEEE Systems Journal, IEEE Transactions on Services Computing, IEEE Journal of Biomedical and Health Informatics, Springer Multimedia Systems, KSII Transactions on Internet and Information Systems, Elsevier Computer Networks.*

CURRENT STATUS

U.S. Permanent Resident, Citizen of China

REFERENCES

Available upon request.