# Shawn Shuoshuo Chen

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## Research Interests

Computer Networks, Operating Systems, High Performance Computing

## Education

**Carnegie Mellon University** Aug. 2021 – present
Ph.D. in Computer Science Pittsburgh, PA
Advisors: Prof. Peter Steenkiste and Prof. Srinivasan Seshan

**University of Virginia** Aug. 2014 – May 2016
M.S. in Computer Engineering Charlottesville, VA
Advisor: Prof. Malathi Veeraraghavan

**Wuhan University** Sep. 2010 – Jun. 2014
B.S. in Electrical Engineering Wuhan, China

## Experience

**Research Assistant** Aug. 2021 – present
Computer Science Department, Carnegie Mellon University Pittsburgh, PA

- Improving large-scale ML training efficiency via reconfigurable optical networks.
- Building ultra-fast optical packet switching fabrics.
- Designed time-division TCP for reconfigurable data center networks.
- Optimized hardware-constrained data center traffic engineering.

**Research Intern** May 2024 – Aug. 2024
Microsoft Redmond, WA

- [currently confidential].

**Research Intern** May 2022 – Aug. 2022
Microsoft Research Redmond, WA

- Optimized datacenter RPC communication performance.

**Technical Lead / Software Engineer** Oct. 2016 - Apr. 2021
Google Network Infrastructure Team Sunnyvale, CA

- Led continuous performance optimization on data center network topology and routing efficiency.
- Improved the scalability and availability of Google's data center fabrics - Jupiter.
- Built Google's in-house SDN controller - Orion.

**Research Assistant** Aug. 2014 – May 2016
Computer Engineering Department, University of Virginia Charlottesville, VA

- Designed and implemented a reliable multicast protocol - File Multicast Transport Protocol (FMTP), deployed and verified on GENI testbed.
- Developed a high performance traffic shaping/pacing solution based on the host network stack, including modifications on TCP congestion control, socket buffering and tc queueing disciplines.

- Conducted performance modeling and optimization on filestream traffic pattern, FMTP throughput, and system resource requirements.

**Research Intern** Nov. 2013 – Aug. 2014
AMD Xilinx Shanghai, China

- Wrote switch stack software to enable a runtime reconfigurable packet processing pipeline (Openflow 1.3 compatible) for an FPGA-based open source SDN switch (ONetSwitch).
- Benchmarked switch packet forwarding rate, maximum concurrent flows, TCAM lookup latency etc.

**Software Development Intern** Jul. 2013 – Sep. 2013
MeshSr Co. Nanjing, China

- Customized a light weight Linux kernel and bootloader for switch OS.
- Ported CPqD OpenFlow software switch to ARM platform.

**Undergraduate Research Assistant** Sep. 2012 – Dec. 2012
Xilinx-Wuhan University IC Design Joint Lab Wuhan, China

- Built a stateful firewall in an MPLS network.
- Offloaded expensive firewall functions to a server via port mirroring.

## Teaching

CS 15-441/641 Networking and the Internet, CMU: fall 2021

CS/ECE 4457 Computer Networks, UVA: fall 2014, fall 2015

## Awards and Membership

NYU Henry M. MacCracken Fellowship (declined) 2020

Silver Perfy Award, *Google* 2019

Academic Excellence Award Nomination, *University of Virginia* 2016

OpenHW Vivado HLS Contest Runner-up, *Xilinx* 2014

Outstanding Undergraduate Milestone Project, *Wuhan University* 2014

ACM Member/ACM@CMU Member

## Talks and Presentations

Zero Buffer Optical Packet Switching Data Center Network

- At NSDI'24, Santa Clara, CA. (Apr. 2024)

Optical Network Infrastructure Support for Machine Learning

- At Google Networking Research Summit (Oct. 2023)

Precise Data Center Traffic Engineering with Constrained Hardware Resources

- At Google S2Infra team. (Jul. 2023)
- At Google systems talks seminar. (Apr. 2024)
- At NSDI'24, Santa Clara, CA. (Apr. 2024)
- At Harvard. (May. 2024)

Time-division TCP for reconfigurable data center networks

- At MIT. (Aug. 2022)
- At ACM SIGCOMM'22, Amsterdam, Netherlands. (Aug. 2022)
- At Google S2Infra team. (Sep. 2022)

Advances in Reliable File-Stream Multicasting over Multi-Domain Software Defined Networks (SDN)

- At IEEE ICCCN, Valencia, Spain. (Jul. 2019)

Network Infrastructure at Google

- At the School of Engineering and Applied Science, University of Virginia. (Mar. 2019)

Optimizing SDN Routing Convergence at Scale

- At Google research conference. (Aug. 2018)

## Publications

[1] **Shawn Shuoshuo Chen**, Keqiang He, Rui Wang, Srinivasan Seshan, Peter Steenkiste. Precise Data Center Traffic Engineering with Constrained Hardware Resources. In Proceedings of the 21st USENIX Symposium on Networked Systems Design and Implementation (NSDI '24). Santa Clara, CA. April 2024.

[2] **Shawn Shuoshuo Chen**, Weiyang Wang, Manya Ghobadi, Srinivasan Seshan, Peter Steenkiste. Zero Buffer Optical Packet Switching Data Center Network. In poster session of the 21st USENIX Symposium on Networked Systems Design and Implementation (NSDI '24 poster). Santa Clara, CA. April 2024.

[3] **Shawn Shuoshuo Chen**, Weiyang Wang, Christopher Canel, Srinivasan Seshan, Alex C. Snoeren, Peter Steenkiste. Time-division TCP for reconfigurable data center networks. In Proceedings of the ACM SIGCOMM 2022 Conference (SIGCOMM '22). Amsterdam, Netherlands. August 2022.

[4] Andrew D. Ferguson, Steve Gribble, Chi-Yao Hong, Charles Killian, Waqar Mohsin, Henrik Muehe, Joon Ong, Leon Poutievski,Arjun Singh, Lorenzo Vicisano, Richard Alimi, **Shawn Shuoshuo Chen**, Mike Conley, Subhasree Mandal, Karthik Nagaraj, Kondapa Naidu Bollineni, Amr Sabaa, Shidong Zhang, Min Zhu, Amin Vahdat. Orion: Google's Software-Defined Networking Control Plane. In Proceedings of the 18th USENIX Symposium on Networked Systems Design and Implementation (NSDI '21). Santa Clara, CA. April 2021.

[5] Yuanlong Tan, **Shuoshuo Chen**, Steve Emmerson, Yizhe Zhang, Malathi Veeraraghavan. Advances in Reliable File-Stream Multicasting over Multi-Domain Software Defined Networks (SDN). In Proceedings of the 28th International Conference on Computer Communication and Networks (ICCCN). Valencia, Spain. July 2019.

[6] **Shuoshuo Chen**, Xiang Ji, Malathi Veeraraghavan, Steve Emmerson, Joseph Slezak, Steven G. Decker. A cross-layer Multicast-Push Unicast-Pull (MPUP) architecture for reliable file-stream distribution. In Proceedings of the IEEE 40th Annual Computer Software and Applications Conference (COMPSAC). Atlanta, GA. June 2016.