Yiyang Chang

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Industry Experience

Researcher in System and Networking — ByteDance Inc., Bellevue, WA
Manager: Dr. **Chuanxiong Guo** — Aug 2019 – Present

Research Intern — Microsoft Research, Redmond, WA
Manager: Dr. **Jin Li** — May 2017 – Aug 2017

- Prototyped a distributed deep learning training system over RDMA, which accelerated a production-level model training speed by 6.5X
- Contributed to TensorFlow open source project (#11416)

Software Development Engineer Intern — Microsoft, Redmond, WA
Manager: **Praveen Balasubramanian** — May 2016 – July 2016

- Prototyped and shipped TCP CUBIC congestion control in Windows 10
- Demonstrated a performance improvement in data transfer throughput compared with conventional congestion control algorithm

Research Intern — Futurewei Technologies, Santa Clara, CA
Mentors: Dr. **Shuo Yang** and Dr. **Haoyu Song** — May 2014 – Aug 2014

- Prototyped an SDN-based cloud monitoring system with OpenStack
- Deployed a physical SDN with Pica8 switches and Ryu controller

Education

Purdue University — West Lafayette, IN
Ph.D. in Computer Engineering, ECE — Aug 2013 – July 2019

- GPA: 3.9/4.0

Peking University — Beijing, China
B.S. in Micro-electronics, EECS — Sept 2009 – July 2013

- GPA: 3.8/4.0 (Major), 3.6/4.0 (Overall)

Research Experience

Network Performance SLOs Certification — Purdue, West Lafayette, IN
Advisors: Prof. **Sanjay Rao** and Prof. **Mohit Tawarmalani** — Oct 2015 – July 2019

- Designed an optimization framework and algorithms for certifying network performance SLOs, under uncertain failures and demands

- Implemented an SDN testbed emulating linked-based protection routing with Mininet and Open vSwitch.

SDN Application Synthesis with Z3 Purdue, West Lafayette, IN
Advisors: Prof. **Sanjay Rao** Nov 2014 – Oct 2015

- Proposed a logic programming based approach to compose SDN applications (e.g., middleboxes and traffic engineering)
- Developed a constrained shortest-path algorithm with Microsoft Z3 solver, evaluated the scalability with fat-tree topologies

Scalable Distributed SDN Controller Purdue, West Lafayette, IN
Advisors: Prof. **Sanjay Rao** and Prof. **T. N. Vijaykumar** Nov 2014 – July 2015

- Designed a framework to optimize distributed SDN controllers with functional partition instead of conventional topological partition
- Extended Floodlight SDN controller source code to conduct performance measurements

App-specific Virtual Machine (VM) Selection in the Cloud Purdue, West Lafayette, IN
Advisors: Prof. **Sanjay Rao** and Prof. **T. S. Eugene Ng** Sept 2013 – Aug 2014

- VM selection based on historical workload and online measurement, with cost controlled by machine learning and pruning algorithms
- Investigated the root cause of performance variation on AWS EC2

Publications

- **Yiyang Chang**, Sanjay Rao, and Mohit Tawarmalani. "Robust Validation of Network Designs under Uncertain Demands and Failures", pp. 347–362, **USENIX NSDI**, 2017. (Acceptance rate: $46/253 = 18.2\%$)

- **Yiyang Chang**, Ashkan Rezaei, Balajee Vamanan, Jahangir Hasan, Sanjay Rao, and T. N. Vijaykumar. "Hydra: Leveraging Functional Slicing for Efficient Distributed SDN Controllers", pp. 251–258, **IEEE COMSNETS**, 2017. (Acceptance rate: $49/192 = 25.5\%$. The paper was one of ten selected papers invited to submit an extended version for a Special volume of Springer Lecture Notes in Computer Science (LNCS) series)

- **Yiyang Chang**, Ashkan Rezaei, Balajee Vamanan, Jahangir Hasan, Sanjay Rao, and T. N. Vijaykumar. "Exploring Functional Slicing in the Design of Distributed SDN Controllers,", vol. 10340, pp. 177–199, **Communication Systems and Networks. COMSNETS 2017, Revised Selected Papers and Invited Papers. Lecture Notes in Computer Science (LNCS)**, Springer, 2017.

- **Yiyang Chang**, Gustavo Petri, Sanjay Rao, and Tiark Rompf. "Composing Middlebox and Traffic Engineering Policies in SDNs", pp. 396–401, **IEEE INFOCOM Workshop SWFAN**, 2017. (Acceptance rate: $10/20 = 50\%$)

- Mohammad Hajjat, Ruiqi Liu, **Yiyang Chang**, T. S. Eugene Ng, and Sanjay Rao. "Application-Specific Configuration Selection in the Cloud: Impact of Provider Policy and Potential of Systematic Testing", pp. 873–881, **IEEE INFOCOM**, 2015. (Acceptance rate: 316/1640 = 19.3%)

Research Interests

- Network Planning with Optimization
- SDN and NFV
- Cloud Computing
- Distributed Systems
- Deep Learning

Course Projects

Real-time Video Analysis System ECE 673: Distributed Computing Systems (A+)

- Designed a real-time video analysis system using content-aware partition and pipelines, based on MapReduce
- Built a prototype and demonstrated video analysis accuracy improved by 25% for people counting application, compared with state-of-the-art

Linux Kernel Hacking ECE 695: Operating System (A)

- Developed a usage-limiting CPU scheduler based on Linux Complete Fair Scheduler
- Visualized the memory page reference count in a Linux-ARM kernel
- Developed a basic shell featuring pipe, background, zombie process cleanup, etc.

Paxos, Reliable Multicast, and Byzantine Generals CS 505: Distributed System (A)

- Implemented a Paxos-based replication protocol, a total-ordering multicast service, and the Byzantine Generals algorithm in C

Compiler for LITTLE ECE 573: Compiler (A)

- Developed a full-fledged compiler for a lightweight language, LITTLE, with flex and bison in C++

Web Application ECE 595: Computer Network Systems (A)

- Optimized the performance of a web application with a multi-tier design on Amazon EC2

Socket Programming ECE 463: Intro to Computer Networking (A)

- Developed an event-driven concurrent web server using select()
- Implemented a simple version of distance-vector routing protocol

Other Applicable Courses

- ECE 608: Computational Models and Methods (A+)
- AAE 590: Introduction to Convex Optimization (A)
- MA 527: Advanced Mathematics For Engineers And Physicists I (A)
- MA 511: Linear Algebra Application (A+)

Honors, Awards and Grants

Facebook Fellowship Finalist, Facebook Inc.	*Jan 2018*
Bilsland Dissertation Fellowship, Purdue University	*Jan 2018*
NSDI 2017 Travel Grant	*Mar 2017*
Sigcomm 2015 Travel Grant	*Aug 2015*
SOSR 2015 Travel Grant	*June 2015*
National Scholarship, Peking University	*Dec 2012*
Google Excellence Scholarship, Google Inc.	*May 2012*
Outstanding Student Award, Peking University	*Dec 2012*
May Fourth Scholarship, Peking University	*Dec 2011*

Technical Skills

Programming	Python (proficient), C/C++, Linux Shell Script
Optimization	Gurobi, GAMS, Pyomo, CPLEX, BARON
Cloud Computing	Amazon Web Services, Docker, Kubernetes, OpenStack
Software-Defined Network	ONOS, Mininet, Open vSwitch, Wireshark, Floodlight, Ryu
Deep Learning	TensorFlow
Software Development	Git, GDB, Valgrind, Vim, LaTeX
Kernel Debugging	WinDbg, QEMU, Hyper-V, VirtualBox

Teaching Experience

Teaching Fellow, ECE 595: Computer Network Systems	*Spring 2017*
Teaching Fellow, ECE 463: Introduction to Computer Networking	*Fall 2015*
Teaching Assistant, ECE 201: Linear Circuit Analysis I	*Spring 2014 to Spring 2015*
Teaching Assistant, ECE 270: Introduction to Digital System Design	*Fall 2013*

References

Chuanxiong Guo

Director of AI Lab

ByteDance Inc.
Email: guochuanxiong@bytedance.com

Sanjay Rao (Ph.D. advisor)
Associate Professor
Electrical and Computer Engineering
Purdue University
Email: sanjay@ecn.purdue.edu

Jin Li
Partner Research Manager
Microsoft Research
Email: Li.Jin@microsoft.com

Praveen Balasubramanian
Software Engineering Lead
Microsoft
Email: pravb@microsoft.com