

Yiyang Chang

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Education

Purdue University

Ph.D. student in Computer Engineering, ECE

- GPA: 3.9/4.0 (updated to Spring 2017)

West Lafayette, IN

Aug 2013 – Present

Peking University

B.S. in Micro-electronics, EECS

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

Beijing, China

Sept 2009 – July 2013

Research Experience

Robust Validation of Network Design

Advisors: Prof. Sanjay Rao and Prof. Mohit Tawarmalani

- Designed a generic optimization framework for validating network designs, under uncertain failures and demands
- Implemented the framework in GAMS and Pyomo, and evaluated with real-world traffic matrices

Purdue, West Lafayette, IN

Oct 2015 – Present

SDN Application Synthesis with Z3

Advisors: Prof. Sanjay Rao, Prof. Gustavo Petri, and Prof. Tiark Rompf

- 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

Purdue, West Lafayette, IN

Nov 2014 – Oct 2015

Scalable Distributed SDN Controller

Advisors: Prof. Sanjay Rao and Prof. T. N. Vijaykumar

- Designed a framework to optimize distributed SDN controllers with functional partition instead of conventional topological partition
- Hacked Floodlight SDN controller source (Java, sloc: 100k) to design experiments for evaluation

Purdue, West Lafayette, IN

Nov 2014 – July 2015

App-specific Virtual Machine (VM) Selection in the Cloud

Advisors: Prof. Sanjay Rao and Prof. T. S. Eugene Ng

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

Purdue, West Lafayette, IN

Sept 2013 – Aug 2014

Industry Experience

Research Intern

Microsoft Research, Redmond, WA

Manager: Dr. Jin Li

May 2017 – August 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

Software Development Engineer Intern

Microsoft, Redmond, WA

Manager: Praveen Balasubramanian

May 2016 – July 2016

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

Research Intern

Huawei, 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

Publications

- **Yiyang Chang**, Sanjay Rao, and Mohit Tawarmalani. “Robust Validation of Network Designs under Uncertain Demands and Failures”, **NSDI**, 2017.
- **Yiyang Chang**, Ashkan Rezaei, Balajee Vamanan, Jahangir Hasan, Sanjay Rao, and T. N. Vijaykumar. “Hydra: Leveraging Functional Slicing for Efficient Distributed SDN Controllers”, **IEEE COMSNETS**, 2017.
- **Yiyang Chang**, Gustavo Petri, Sanjay Rao, and Tiark Rompf. “Composing Middlebox and Traffic Engineering Policies in SDNs”, **INFOCOM Workshop SWFAN**, 2017.
- 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”, **IEEE INFOCOM**, 2015.

Research Interests

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

Course Projects

Linux Kernel Hacking

ECE 695: Operating System

- 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

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

Compiler for LITTLE

ECE 573: Compiler

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

Web Application

ECE 595: Computer Network Systems

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

Socket Programming

ECE 463: Intro to Computer Networking

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

Honors, Awards and Grants

NSDI 2017 Travel Grant	<i>Mar 2017</i>
Sigcomm 2015 Travel Grant	<i>Aug 2015</i>
SOSR 2015 Travel Grant	<i>June 2015</i>
National Scholarship, Peking University	<i>Dec 2012</i>
Google Excellence Scholarship, Google Inc.	<i>May 2012</i>
Outstanding Student Award, Peking University	<i>Dec 2012</i>

Technical Skills

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

Teaching Experience

TA for ECE 595: Computer Network Systems	<i>Spring 2017</i>
TA for ECE 463: Introduction to Computer Networking	<i>Fall 2015</i>
TA for ECE 201: Linear Circuit Analysis I	<i>Spring 2014 to Spring 2015</i>
TA for ECE 270: Introduction to Digital System Design	<i>Fall 2013</i>

References

Sanjay Rao (advisor)

Associate Professor
Electrical and Computer Engineering
Purdue University
Email: sanjay@ecn.purdue.edu

Mohit Tawarmalani

Professor and Allison and Nancy Schleicher Chair of Management
Krannert School of Management
Purdue University
Email: mtawarma@purdue.edu

Jin Li

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

Praveen Balasubramanian

Software Engineering Lead
Microsoft
Email: pravb@microsoft.com