Kuan-Yen Chou

University of Illinois at Urbana-Champaign

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Summary

I am a PhD student in the Computer Science department at the University of Illinois at Urbana-Champaign, advised by Prof. Matthew Caesar. My research interests include network verification, softwarized networks, programmable networks, and software engineering. Before UIUC, I obtained my Bachelor's degree in Electrical Engineering and Computer Science at National Chiao Tung University in Taiwan.

Experience

Graduate Research Assistant — *Illinois, US*

University of Illinois at Urbana-Champaign — *Aug. 2020 - (to date)*

- Working on a network testing framework combining model checking and emulation for network functions.
- Utilizing binary analysis with LLVM and KLEE to automatically generate faithful models that describe the behavior of software network functions.
- Building a Kubernetes testbed for evaluating a orchestration planning project.

Intern - vRealize Network Insight — *Illinois, US*

VMware Inc. — *May 2020 - Aug. 2020*

- Worked on the network analysis and verification module within a big codebase of vRealize Network Insight.
- Augmented the network analysis module so that it does not require the full network model in memory as most of the network verification tools in academic literature do.
- Implemented the architectural changes, including dynamically loading and unloading partial network models during the process of analysis, in order to verify network properties with low overhead and high efficiency.

Graduate Research Assistant — *Illinois, US*

University of Illinois at Urbana-Champaign — *Aug. 2019 - May 2020*

- Worked on a network testing framework combining model checking verification and emulation for network functions.
- Designed the programming interface between SPIN model checker and the network verification process.
- Integrated emulation instances within isolated network namespaces with the SPIN-driven model checking process.
- Designed and conducting experiments for system evaluation.
- Presented a conference paper about Plankton, a network configuration verification tool based on model checking.

Visiting Scholar — *Illinois, US*

University of Illinois at Urbana-Champaign — *Jun. 2018 - May 2019*

- Worked on Plankton, a network configuration verification project, where we tried to solve the scalability problem of configuration verification with the combination of equivalence partitioning and explicit-state model checking.
- Worked on configuration parsing, configuration generation, and refactoring for evaluation experiments.
- Presented a workshop paper for Plankton-neo, a high-coverage network testing framework combining verification and emulation, in the 2018 SecSoN workshop of ACM SIGCOMM.
- Worked on Bazang, a kernel-level tracing tool for distributed applications that brings network transparency to distributed RPC tracing, where we used gRPC as an example and utilized kernel timestamping and out-of-band collection to achieve the goal.

Teaching Assistant, System/Network Administrator — *Hsinchu, Taiwan*

Computer Center of Computer Science Dept. in NCTU — *Jun. 2016 - Jan. 2018*

- Managed and administered Linux workstations for the CS department and for some CS courses.
- Managed and administered the Postfix/Dovecot mail servers and proxy servers.
- Administered and maintained the PC classrooms.
- Managed some Cisco switches for the CS department campus network.

Full-time Intern *Hsinchu, Taiwan*

National Center for High-performance Computing *Jul. 2017 - Aug. 2017*

- Built NERSC Shifter on a small cluster of workstations.
- Built a GPU cluster with Kubernetes.
- Managed, built, and packaged Docker images for deep learning applications and for future experiments.
- Conducted an experiment evaluating the performance of the Kubernetes cluster and the Shifter cluster.

Technical Skills

Programming	C, C++, Python, Shell, System/Network programming, Linux kernel, Assembly, SQL
Networking	Cisco IOS, Cisco ASA, Linux networking
OSes/Distros	Arch Linux, Ubuntu/Debian, CentOS, FreeBSD
Virtualization	KLEE, Docker, GNS3, Mininet, KVM, QEMU, Kubernetes
Other Tools	Vim, Git, Spin, McSema, Angr

Publications

- Santhosh Prabhu, **Kuan-Yen Chou**, Ali Kheradmand, P. Brighten Godfrey, Matthew Caesar. "Plankton: Scalable network configuration verification through model checking." 17th USENIX Symposium on Networked Systems Design and Implementation, February 2020.

- Sayed Hadi Hashemi, Paul Rausch, Benjamin Rabe, **Kuan-Yen Chou**, Simeng Liu, Volodymyr V. Kindratenko, Roy H. Campbell. "tensorflow-tracing: a performance tuning framework for production." USENIX Conference on Operational Machine Learning, May 2019.

- **Kuan-Yen Chou**, Chin-Fan Chiang, Ching-Hsiang Hsu, Zheng-Yu Chen, Jin-Cheng Zhu. "Implementation of Containerized TensorFlow in Heterogeneous CPU/GPU Clusters." Taiwan Academic Network Conference, October 2017.

Presentations

- Santhosh Prabhu, **Kuan-Yen Chou**, Ali Kheradmand, P. Brighten Godfrey, Matthew Caesar. "Plankton: Scalable network configuration verification through model checking." 17th USENIX Symposium on Networked Systems Design and Implementation, February 2020.

- Santhosh Prabhu, Gohar Irfan Chaudhry, Brighten Godfrey, Matthew Caesar. "High-coverage Testing of Softwarized Networks." Proceedings of the 2018 Workshop on Security in Softwarized Networks: Prospects and Challenges, August 2018.

- **Kuan-Yen Chou**, Chin-Fan Chiang, Ching-Hsiang Hsu, Zheng-Yu Chen, Jin-Cheng Zhu. "Implementation of Containerized TensorFlow in Heterogeneous CPU/GPU Clusters." Taiwan Academic Network Conference, October 2017.

Education

University of Illinois at Urbana-Champaign *Illinois, US*

Ph.D. in Computer Science *Aug. 2019 - Expected Jun. 2024*

National Chiao Tung University *Hsinchu, Taiwan*

B.S. in Electrical Engineering and Computer Science *Sep. 2014 - Jun. 2018*

Awards & Honors

2018	**Exchange Scholarship,** scholarship for exchange program with UIUC in spring 2018	*Hsinchu, Taiwan*
2017	**Academic Excellence Award,** top 3 GPA in the undergraduate program in spring 2017	*Hsinchu, Taiwan*
2016	**Third Place and UI/UX Award,** MeiChu Hackathon	*Hsinchu, Taiwan*
2014	**Academic Excellence Award,** top 3 GPA in the undergraduate program in fall 2014	*Hsinchu, Taiwan*
2014	**Calculus Award,** top 20 among 1248 freshman students	*Hsinchu, Taiwan*