Xiaoqi Chen

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Research Summary	I design and build algorithms for analyzing and processing network traffic at high speed, aiming to improve network performance and security. These algorithms are deployed on programmable switches, enabling real-time closed-loop control in software-defined networks.
Education	**Princeton University**, Department of Computer Science PhD in CS (2017- exp.2023), Advisor: Prof. *Jennifer Rexford* **Tsinghua University**, CS Special Pilot Class (*Yao Class*) Bachelor in CS (2013-2017), Advisor: Prof. *Wei Xu* **Columbia University**, Department of Electrical Engineering Visiting Student (Fall 2015), Advisor: Prof. *Xiaofan (Fred) Jiang*
Industry Experience	**Barefoot Networks**, Software Engineering Intern (Summer 2019) Advanced Applications team, accelerated stream processing **Google**, Software Engineering Intern (Summer 2016) Search Infrastructure group, mobile indexing team
Awards & Honors	**Best Paper Award**, IEEE INFOCOM, 2023 **Best Paper Award**, Symposium on SDN Research (SOSR), 2022 **Siebel Scholars**, class of 2022 *Awarded 82 exceptional graduate students selected across 27 schools worldwide* **Princeton SEAS Graduate Student Award for Excellence**, 2020 *Awarded 16 best-performing advanced students across 500+ PhDs in SEAS* **Finalist, Facebook PhD Fellowship,** 2020 *Top 4% among 1800+ applicants*
Teaching & Mentoring	**Teaching Assistant** • Principles of Computer System Design (Princeton), Fall 2019 • Advanced Computer Networks (Princeton), Fall 2018 • Operating Systems (Tsinghua), Spring 2017 **Assignment Development** • Intro to Computer Networks (Tsinghua), Spring 2017 **Undergraduate Independent Research mentor** • Betsy Pu (Princeton), Fall 2020 • Mack Lee (Princeton), Fall 2019 **Intel-Princeton Research Experience Undergrad (REU) mentor** • Kenneth Poor (Princeton), Summer 2022 • Esha Bhatia (MIT), Summer 2022

Publication (by topic)

Programmable networks:

SmartCookie: Blocking Large-Scale SYN Floods with a Split-Proxy Defense on Programmable Data Planes
S Yoo, X Chen, J Rexford.
To appear in **USENIX Security**, 2024

Sequence Abstractions for Flexible, Line-Rate Network Monitoring
A Johnson, R Beckett, X Chen, R Mahajan, D Walker.
To appear in **NSDI**, 2024

Scalable Real-Time Bandwidth Fairness in Switches
R MacDavid, X Chen, J Rexford.
ToN IEEE/ACM Transactions on Networking, 2023
An earlier version appeared in INFOCOM 2023 **[🏆 Best paper award]**

Fast In-kernel Traffic Sketching in eBPF
S Miano, X Chen, RB Basat, G Antichi.
CCR Computer Communication Review, 2023

Synthesizing State Machines for Data Planes
X Chen*, A Johnson, M Pan, D Walker.
SOSR Symposium on SDN Research, 2022 **[🏆 Best paper award]**

Flow-Level Loss Detection with Δ-Sketches
SL Feibish, Z Liu, N Ivkin, X Chen, V Braverman, J Rexford.
SOSR Symposium on SDN Research, 2022

Unbiased Delay Measurement in the Data Plane
Y Zheng, X Chen, M Braverman, J Rexford.
APoCS Symposium on Algorithmic Principles of Computer Systems, 2022

Experience-Driven Research on Programmable Networks
H Kim, X Chen, J Brassil, J Rexford.
CCR ACM SIGCOMM Computer Communication Review, 2021

BeauCoup: Answering Many Network Traffic Queries, One Memory Update at a Time
X Chen, SL Feibish, M Braverman, J Rexford.
SIGCOMM, 2020

Designing Heavy-Hitter Detection Algorithms for Programmable Switches
RB Basat, X Chen*, G Einziger, O Rottenstreich.
ToN IEEE/ACM Transactions on Networking, 2020
An earlier version appeared in IEEE ICNP 2018

Routing Oblivious Measurement Analytics
RB Basat, X Chen*, G Einziger, SL Feibish, D Raz, M Yu.
IFIP Networking, 2020

Fine-Grained Queue Measurement in the Data Plane
X Chen, SL Feibish, Y Koral, J Rexford, O Rottenstreich, SA Monetti, TY Wang.
CoNEXT, 2019
An earlier version appeared in SIGCOMM 2018 SelfDN workshop

Randomized Admission Policy for Efficient Top-k, Frequency, and Volume Estimation
RB Basat, X Chen*, G Einziger, R Friedman, Y Kassner.
ToN IEEE/ACM Transactions on Networking, 2019

DumbNet: A Smart Data Center Network Fabric with Dumb Switches
Y Li, D Wei, X Chen, Z Song, R Wu, Y Li, X Jin, W Xu.
EuroSys, 2018

Blockchain:

Gosig: A Scalable and High-Performance Byzantine Consensus System for Consortium Blockchains on Wide Area Network
P Li, G Wang, X Chen, F Long, W Xu.
SoCC Symposium on Cloud Computing, 2020

Arbitrum: Scalable, private smart contracts
H Kalodner, S Goldfeder, X Chen, SM Weinberg, EW Felten.
USENIX Security, 2018

*Alphabetically ordered.
For up-to-date publication list, please visit my Google Scholar profile.*

Workshop Papers

Secure Keyed Hashing on Programmable Switches
S Yoo, X Chen.
Workshop on Secure Programmable Network Infrastructure, 2021

Implementing AES Encryption on Programmable Switches via Scrambled Lookup Tables
X Chen.
Workshop on Secure Programmable Network Infrastructure, 2020

Measuring TCP Round-Trip Time in the Data Plane
X Chen, H Kim, JM Aman, W Chang, M Lee, J Rexford.
Workshop on Secure Programmable Network Infrastructure, 2020

Fine-grained P4 Measurement Toolkit for Buffer Sizing in Carrier Grade Networks
S Buccapatnam, X Chen, K Duell, SL Feibish, K Meier-Hellstern, Y Koral, SA Monetti, A Raghuram, J Rexford, J Stango, TT Simon, J Tulko, TY Wang.
Workshop on Buffer Sizing, Stanford University, 2019

Measuring Queues in Campus Network via Link Tapping
X Chen, H Kim.
Workshop on Buffer Sizing, Stanford University, 2019

Professional Services

Journal Reviewer:
- IEEE/ACM Transaction on Networking, 2020-2022
- Elsevier Computer Networks, 2022
- Journal of Network and Computer Applications, 2019-2021
- Transactions on Network Science and Engineering, 2021
- Transactions on Network and Service Management, 2022
- Transactions on Information Forensics & Security, 2022

Shadow Technical Program Committee:
- IMC 2022
- Eurosys 2022

Artifact Evaluation Committee:
- SIGCOMM 2021, 2022, 2023
- CoNEXT 2022, 2023 (chair)

External Reviewer: INFOCOM 2020, USENIX Security 2023
Student Volunteer: SIGCOMM 2020

Invited Talks

Building Smarter Networks with In-network Computing
Harvard Theory-System Seminar (March 7th, 2023)

BeauCoup: Answering Many Network Traffic Queries, One Memory Update at a Time
Tong Yang group, School of EECS, Peking University (Jul 27th, 2020), Network Programming Initiative Zoom Seminar (Jul 30th, 2020)

ConQuest: Fine-grained Queue Measurements in the Data Plane
IIIS, Tsinghua University (Dec 31st, 2019), APNIC Network from Home (Aug 4th, 2020)

Campus Network as a P4 Lab
IIIS, Tsinghua University (Aug 21st, 2019), SIGCOMM 2019 P4 tutorial (Aug 23rd, 2019), Network Programming Initiative Fall Retreat (Oct 11th, 2019)

High-speed network measurement under constrained programming model
Network Programming Initiative Zoom Seminar (Mar 28th, 2019)

Efficient Measurement on Programmable Switches using Probabilistic Recirculation
P4-Apps Working Group (Aug 16th, 2018)

Dancing with Chains: Fitting Measurement Algorithms in P4 Switches
AT&T Labs (June 8th, 2018), Barefoot Networks (Aug 3rd, 2018)

Programmable Data Plane and its Application in Network Monitoring
IIIS, Tsinghua University (Dec 21st, 2017)