Yunming Xiao

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RESEARCH INTERESTS

I am broadly interested in computer networks and systems. My current research focuses on enhancing the security, privacy, and reliability of Internet services and infrastructure.

EDUCATION

Ph.D., Computer Science — Sep 2019 - Jun 2024
Northwestern University, Evanston, IL
Thesis: *Revising System Premises For a Secure and Private Web*
Advisor: Aleksandar Kuzmanovic

B.Eng., Computer Science — Sep 2015 - Jun 2019
Beijing University of Posts and Telecommunications, Beijing, China

RESEARCH AND WORK EXPERIENCE

University of Michigan, Ann Arbor, MI — Jun 2024 - *Present*
Research Fellow, Advisor: *Prof. Ang Chen*

Northwestern University, Evanston, IL — Sep 2019 - May 2024
Research Assistant, Advisor: *Prof. Aleksandar Kuzmanovic*

Hewlett Packard Labs, Milpitas, CA — May - Aug 2022 (Full time) & Jan 2023 - Jan 2024 (Part-time)
Research Intern, Networking and Distributed Systems Lab, Host: *Dr. Puneet Sharma*

Google, New York City, NY — Sep - Dec 2022
Software Engineering Intern, Technical Systems & Infrastructure (TI)

Nokia Bell Labs, Murray Hill, NJ (Remote) — Jun - Aug 2021
Networking Bell Labs Summer Intern, Host: *Dr. Matteo Varvello, Dr. T.V. Lakshman*

Bytedance, Beijing, China — Mar - Jul 2019
Infrastructure R&D Intern

Tsinghua University, Beijing, China — Mar 2018 - Mar 2019
Research Assistant, Host: *Prof. Wenfei Wu*

King Abdullah University of Science and Technology, Jeddah, KSA — Jul - Oct 2018
Visiting Student, Host: *Prof. Marco Canini*

GRANTS AND AWARDS

Co-lead the development of NSF grant CNS-2310927: "Privacy-Preserving and Censorship-Resistant Domain Name System" ($750K, PI: Aleksandar Kuzmanovic, Co-PI: Xiao Wang).

Co-lead the development of NSF grant CNS-2226107: "Enabling Streaming Analytics at the Network Edge" ($400K, PI: Aleksandar Kuzmanovic).

EuroSys Best Student Paper Award, 2024
Northwestern University PhD Terminal Year Fellowship, 2023
Travel Grant For ACM HotNets'23
HPE Best-in-Class Technical Competition Award, 2022
Distinguished Undergraduate Student in Beijing, 2019

PUBLICATIONS

(* Equal Contribution)

Conference Publications

- [C12] Shihan Lin, Suting Chen, **Yunming Xiao**, Yanqi Gu, Xiaowei Yang, Aleksandar Kuzmanovic:
  PreAcher: Secure and Practical Password Pre-Authentication by Content Delivery Networks.
  To appear in USENIX Symposium on Networked Systems Design and Implementation (*NSDI'25*).
  (21 pages, acceptance rate: 55/401=13.7%)

- [C11] Y Liu*, **Y Xiao***, X Zhang, W Dang, H Liu, X Li, Z He, J Wang, A Kuzmanovic, A Chen, C Miao:
  Unlocking ECMP Programmability for Precise Traffic Control.
  To appear in USENIX Symposium on Networked Systems Design and Implementation (*NSDI'25*).
  (19 pages, acceptance rate: 55/401=13.7%)

- [C10] J Lu, **Y Xiao**, S Chakraborty, S Fu, Y Ji, A Chen, M Chowdhury, N Rao, S Ratnasamy, X Wang
  OpenInfra: A Co-simulation Framework for the Infrastructure Nexus.
  In Workshop on Hot Topics in System Infrastructure (*HotInfra'24*). (5 pages)

- [C9] C Miao*, Z Zhong*, **Y Xiao***, F Yang*, S Zhang*, C Lu, J Geng, Y Wang, X Zhou, Y Jiang, Z Bai, C Yang:
  MegaTE: Extending WAN Traffic Engineering to Millions of Endpoints.
  In Proceedings of ACM *SIGCOMM'24*. (14 pages, acceptance rate: 62/366=16.9%)

- [C8] **Y Xiao**, DZ Tootaghaj, A Dhakal, L Cao, P Sharma, A Kuzmanovic:
  Conspirator: SmartNIC-Aided Control Plane for Distributed ML Workloads.
  In Proceedings of USENIX Annual Technical Conference (*ATC'24*).
  (19 pages, CCF-A, acceptance rate: 77/482=15.9%)

- [C7] **Yunming Xiao**, Yibo Zhao, Sen Lin, Aleksandar Kuzmanovic:
  Snatch: Online Streaming Analytics at the Network Edge.
  In Proceedings of the ACM European Conference on Computer Systems (*EuroSys'24*).
  (21 pages, acceptance rate: 39/244=15.9%)
  Best Student Paper Award! (selection rate: 1/244=0.4%)

- [C6] C Miao*, **Y Xiao***, M Canini, R Dai, S Zheng, J Wang, J Bu, A Kuzmanovic, Y Wang:
  TENSOR: Lightweight BGP Non-Stop Routing.
  In Proceedings of ACM *SIGCOMM'23*. (14 pages, acceptance rate: 73/325=22.5%)

- [C5] **Yunming Xiao**, Matteo Varvello:
  FIAT: Frictionless Authentication of IoT Traffic.
  In Proceedings of ACM Conference on Emerging Network Experiment and Technology (*CoNEXT'22*).
  (15 pages, CCF-B, acceptance rate: 29/151=19.2%)

- [C4] **Yunming Xiao**, Sarit Markovich, Aleksandar Kuzmanovic:
  Blockchain Mining: Optimal Resource Allocation.
  In Proceedings of ACM Advances in Financial Technologies (*AFT'22*).
  (14 pages, acceptance rate: 23/79=29.1%)

- [C3] **Yunming Xiao**, Matteo Varvello, Aleksandar Kuzmanovic:
  Monetizing Spare Bandwidth: the Case of Distributed VPNs.
  In Proceedings of the ACM on Measurement and Analysis of Computing Systems (*SIGMETRICS'22*).
  (27 pages, acceptance rate: 13/122=10.7%)

- [C2] Marc Anthony Warrior, **Yunming Xiao**, Matteo Varvello, Aleksandar Kuzmanovic:
  De-Kodi: Understanding the Kodi Ecosystem.
  In Proceedings of The Web Conference 2020 *(WWW'20)*.
  (11 pages, acceptance rate: 357/1736=20.6%)

- [C1] **Yunming Xiao**, Haifeng Sun, Zirui Zhuang, Jingyu Wang, Qi Qi:
  Common Knowledge Based Transfer Learning for Traffic Classification.
  IEEE 43rd Conference on Local Computer Networks *(LCN'18)*. (4 pages)

Journal Publications

- [J5] **Yunming Xiao**, Matteo Varvello, Marc Anthony Warrior, Aleksandar Kuzmanovic:
  Decoding the Kodi Ecosystem.
  ACM Transactions on the Web *(TWEB)*, 17(1), pp.1-36. 2023.

- [J4] P Wang, Z Wei, H Qi, S Wan, **Y Xiao**, G Sun, Q Zhang:
  Mitigating Poor Data Quality Impact with Federated Unlearning for Human-Centric Metaverse.
  IEEE Journal on Selected Areas in Communications *(JSAC)*, 42(4), pp. 832-849. 2023.

- [J3] Aritra Dutta, El Houcine Bergou, **Yunming Xiao**, Marco Canini, Peter Richtárik:
  Direct Nonlinear Acceleration.
  EURO Journal on Computational Optimization, 10, 100047 (26 pages). 2022.

- [J2] P Wang, Y Zhao, MS Obaidat, Z Wei, H Qi, C Lin, **Y Xiao**, Q Zhang:
  Blockchain-Enhanced Federated Learning Market with Social Internet of Things.
  IEEE Journal on Selected Areas in Communications *(JSAC)*, 40(12), pp. 3405-3421. 2022.

- [J1] **Yunming Xiao**, Bin Wu:
  Close spatial arrangement of mutants favors and disfavors fixation.
  PLoS Computational Biology, 15(9), e1007212 (20 pages). 2019.

Refereed Demos/Posters

- [D4] **Yunming Xiao**, Mushtari Sadia, Ang Chen:
  Multi-modal Swarm Intelligence for Secure UAV Missions.
  GENZERO 2024 Workshop.

- [D3] **Yunming Xiao**, Chenkai Weng, Ruijie Yu, Peizhi Liu, Matteo Varvello, Aleksandar Kuzmanovic:
  Demo: PDNS: A Fully Privacy-Preserving DNS.
  In Proceedings of *SIGCOMM'23*.

- [D2] **Yunming Xiao**, Matteo Varvello:
  FIAT: Frictionless Authentication of IoT Traffic.
  In Proceedings of ACM *CoNEXT'21*.

- [D1] **Yunming Xiao**, Matteo Varvello, Aleksandar Kuzmanovic:
  A First Look Into Distributed VPNs.
  In the 21st ACM Internet Measurement Conference *(IMC'21)*.

Un-refereed & Working Papers

- [W4] **Y Xiao**, A Kuzmanovic, Y Yang, X Li, D Gu, M Wan, C Pei, J Wang, C Miao:
  UPath: Unified Packet Tracing and Analysis for Heterogeneous Cloud Gateways.
  In Submission.

- [W3] C Miao*, **Y Xiao***, D Gu, J Wang, Y Yang, M Wan, C Pei, A Kuzmanovic, Z Liu:
  Seamless Migration of Stateful Gateway in Large-Scale Cloud.
  In Submission.

■ [W2] **Yunming Xiao**, Yiwei Du, Matteo Varvello, Pengfei Wang, Linghe Kong:
Third-Party Frictionless Authentication For Home IoT Traffic.
In Submission.

■ [W1] **Yunming Xiao**, Chenkai Weng, Ruijie Yu, Peizhi Liu, Matteo Varvello, Aleksandar Kuzmanovic:
PDNS: Collusion Resistant DNS With Private Information Retrieval.
In Submission.

PATENTS

[P4] Diman Zad Tootaghaj, **Yunming Xiao**, Aditya Dhakal, Puneet Sharma:
Job Allocations to Fractions of Parallel Processing Units.
Filed on June 2024.

[P3] Diman Zad Tootaghaj, **Yunming Xiao**, Aditya Dhakal, Puneet Sharma:
DMA Transfers of Job Data From an Adapter to Parallel Processing Unit Fractions.
Filed on June 2024.

[P2] **Yunming Xiao**, Diman Zad Tootaghaj, Aditya Dhakal, Puneet Sharma:
Conspirator: A SmartNIC Aided Control Plane for Distributed Machine Learning Workloads.
Filed on September 2023.

[P1] Diman Zad Tootaghaj, **Yunming Xiao**, Aditya Dhakal, Puneet Sharma:
Job Allocations To Graphics Processing Units With Tenant Isolation.
US 18/299,855. October 2024.

TEACHING AND MENTORING EXPERIENCE

Teaching

Teaching Assistant, Northwestern University

- COMP_SCI 397/497: Selected Topics in Computer Networks – Spring 2021, 2022, 2023, 2024
- COMP_SCI 340: Intro to Computer Networking – Winter 2022
- COMP_SCI 110: Intro to Computer Programming – Fall 2020

Mentoring

- Mushtari Sadia (PhD student @ UMich): co-authored [D4], working on the extension
- Archit Bhatnagar (PhD student @ UMich): working on a privacy-preserving advertisement system project
- Jiaheng Lu (undergraduate @ UMich): co-authored [C10], working on the extension
- Suting Chen (undergraduate @ ShanghaiTech → PhD student @ Northwestern): co-authored [W6]
- Yibo Zhao (undergraduate @ ShanghaiTech → PhD student @ UMD): co-authored [C7]
- Yiwei Du (master student @ Rice University): co-authored [W2]
- Peizhi Liu (undergraduate → PhD student @ Northwestern) co-authored [D3] and [W1]
- Ruijie Yu (master student @ Northwestern → software engineer @ Alibaba): co-authored [D3] and [W1]
- Grayson Donnelly (undergraduate @ Northwestern): worked on extension of the Snatch project [C7]. He won the McCormick Summer Undergraduate Research Award in 2022.

INVITED & CONFERENCE TALKS

Duke University, “Snatch: Online Streaming Analytics at the Network Edge”, Remote, November 2024.
USENIX ATC’24, “Conspirator: SmartNIC-Aided Control Plane for Distributed ML Workloads”, Santa Clara, CA, July 2024.
Hewlett Packard Labs, “Conspirator: SmartNIC-Aided Control Plane for Distributed ML Workloads”, Milpitas, CA (Remote), July 2024.
EuroSys’24, “Snatch: Online Streaming Analytics at the Network Edge”, Athens, Greece (Remote), April 2024.
University of Texas at Arlington, “Renovating Internet Services: Towards a Secure, Private, and Reliable Web”,

March 2024.
The University of Houston, "Renovating Internet Services: Towards a Secure, Private, and Reliable Web", February 2024.
HKUST-GZ, "Renovating Internet Services: A New Paradigm for a Secure, Private, and Reliable Online Infrastructure", Guangzhou, China (Remote), January 2024.
Rice University, "Renovating Internet Services: A New Paradigm for a Secure, Private, and Reliable Online Infrastructure", Houston, TX, November 2023.
Illinois Institute of Technology, "TENSOR: Lightweight BGP Non-Stop Routing", Chicago, IL, October 2023.
SIGCOMM'23, "TENSOR: Lightweight BGP Non-Stop Routing", New York City, NY, September 2023.
CoNEXT'22, "FIAT: Frictionless Authentication of IoT Traffic", Rome, Italy (Remote), December 2022.
Nokia Bell Labs, "FIAT: Frictionless Authentication of IoT Traffic", Murray Hill, NJ, November 2022.
SIGMETRICS'22, "Monetizing Spare Bandwidth: The Case of Distributed VPNs", Mumbai, India (Remote), June 2022.

SERVICE

Program Committee Member

ACM Conference on Computer and Communications Security (CCS): 2025
Privacy Enhancing Technologies Symposium (PETS/PoPETs): 2025
Asia-Pacific Workshop on Networking (APNet): 2025
ACM SIGCOMM (CCF-A), Artifact Evaluation: 2022, 2023
ACM Symposium on Operating Systems Principles (SOSP), Artifact Evaluation: 2023

Reviewer

ACM SIGCOMM Computer Communication Review (CCR)
IEEE Journal on Selected Areas in Communications (JSAC)
Journal of Systems Architecture (JSA)
IEEE Transactions on Sustainable Computing

REFERENCES

- Aleksandar Kuzmanovic (Doctoral Advisor)
  Professor, Northwestern University
  ✉ akuzma@northwestern.edu
- Ang Chen
  Associate Professor, University of Michigan
  ✉ chenang@umich.edu
- Marco Canini
  Associate Professor, King Abdullah University of Science and Technology
  ✉ marco@kaust.edu.sa
- Xiaowei Yang
  Professor, Duke University
  ✉ xwy@cs.duke.edu
- Matteo Varvello
  Networking Researcher, Nokia Bell Labs
  ✉ matteo.varvello@nokia.com
- Puneet Sharma
  Director, Networking and Distributed Systems Lab, Hewlett Packard Labs
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