Diwen Xue

PhD Candidate, Computer Science & Engineering
University of Michigan diwenx@umich.edu

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Research Overview

My research focuses on areas where the privacy, security and availability implications of networked systems affect users in the real world. I conduct Internet measurements at scale, use those observations to refine threat models, and build countermeasures to safeguard users' communication on this increasingly adversarial Internet.

Education

- Ph.D. in Computer Science and Engineering, University of Michigan, 2020 - Present
  Advisor: Prof. Roya Ensafi
- M.S. in Computer Science and Engineering, University of Michigan, 2020 - 2023
- B.A. in Computer Science, New York University, Spring 2020
  Minor in Mathematics
  GPA: 3.86/4.00, *magna cum laude*

Research Awards and Honors

- **Rackham Predoctoral Fellowship** *(March, 2025)*
  I was awarded the Rackham Predoctoral Fellowship that supports "students working on dissertations that are unusually creative, ambitious, and impactful."
- **Towner Prize for Distinguished Academic Achievement** *(February, 2025)*
  I was awarded the Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement for 2025. This award is presented to one individual in each program annually.
- **University of Michigan CSE Honors Competition - First Place** *(November, 2023)*
  The annual Honors Competition highlights outstanding research by Ph.D students. My talk on meausring network interferences was awarded first place in 2023.
- **First Place at CSAW'22 Applied Research Competition** *(November, 2022)*
  Our paper: "VPNalyzer: Systematic Investigation of the VPN Ecosystem" won first place at the US-Canada CSAW'22 Applied Research Competition.
- **First Prize in the 2022 Internet Defense Prize,** *(August, 2022)*
  Our paper: "OpenVPN is Open to VPN Fingerprinting" won the ***First Prize*** *in the USENIX 2022 Internet Defense Prize ($110,000 Cash Prize).*
- **USENIX'22 Distinguished Paper Award** *(August, 2022)*
  Our paper: "OpenVPN is Open to VPN Fingerprinting" won the USENIX Distinguished Paper.

Refereed Conference Publications

[1] [PETS'25] **Blocking-Resistant Communication Using Push Notifications**
P. Kumar, *Diwen Xue*, A. Ortwein, C. Bocovich, Harry, and R. Ensafi
In: 25th Privacy Enhancing Technologies Symposium

[2] [NDSS'25] **The Discriminative Power of Cross-layer RTTs in Fingerprinting Proxy Traffic**
Diwen Xue, R. Stanley, P. Kumar, and R. Ensafi
In: Network and Distributed System Security Symposium 2025

[3] [FOCI'25] **Is Custom Congestion Control a Bad Idea for Circumvention Tools?**
W. Wang, *Diwen Xue*, P. Kumar, A. Mishra, Anonymous, and R. Ensafi
In: Free and Open Communications on the Internet, 2025

[4] [USENIX'24] **Fingerprinting Obfuscated Proxy Traffic with Encapsulated TLS Handshakes**
Diwen Xue, M. Kallitsis, A. Houmansadr, and R. Ensafi
In: USENIX Security Symposium 2024

[5] [USENIX'24] **Bridging Barriers: A Survey of Challenges and Priorities in the Censorship Circumvention Landscape**
*Diwen Xue**, A. Ablove*, R. Ramesh, G. Kwak-Danciu and R. Ensafi
In: USENIX Security Symposium 2024

[6] [PETS'24] **Attacking Connection Tracking Frameworks as used by Virtual Private Networks**
B. Mixon-Baca, J. Knockel, *Diwen Xue*, T. Ayyagari, D. Kapur, R. Ensafi, and J. Crandall
In: 24th Privacy Enhancing Technologies Symposium

[7] [FOCI'23] **The Use of Push Notification in Censorship Circumvention**
Diwen Xue and R. Ensafi
In: Free and Open Communications on the Internet, 2023

[8] [IMC'22] **TSPU: Russia's Decentralized Censorship System**
Diwen Xue, B.Mixon-Baca, ValdikSS, A. Ablove, B. Kujath, J. Crandall, and R. Ensafi
In: Internet Measurement Conference 2022

[9] [USENIX'22] **OpenVPN is Open to VPN Fingerprinting**
Diwen Xue, R. Ramesh, A. Jain, M. Kallitsis, J. Halderman, J. Crandall, and R. Ensafi
In: USENIX Security Symposium 2022
***Award:* Distinguished Paper Award Winner & First Prize Winner of the 2022 Internet Defense Prize**

[10] [NDSS'22] **VPNalyzer: Systematic Investigation of the VPN Ecosystem**
R. Ramesh, L. Evdokimov, *Diwen Xue*, and R. Ensafi
In: Network and Distributed System Security Symposium 2022
***Award:* Won First Place at the CSAW '22 Applied Research Competition.**

[11] [IMC'21] **Throttling Twitter: An Emerging Censorship Technique in Russia**
Diwen Xue, R. Ramesh, ValdikSS, L. Evdokimov, A. Viktorov, A. Jain, E. Wustrow, S. Basso, and R. Ensafi
In: ACM Internet Measurement Conference (IMC) 2021
Recognized as the Highest Scoring Short Paper at IMC'21

Other Articles

[12] **Fingerprinting Deep Packet Inspection Devices by their Ambiguities**
Diwen Xue, A. Huremagic, W. Wang, R. Ram Sundara Raman, and R. Ensafi
Under Submission; CCS'25.

[13] **CryptoSluice: Privacy-Preserving Traffic Analysis of Weak Transport Layer Encryption at Internet Gateways**
B. Mixon-Baca, *Diwen Xue*, R. Ensafi, and J. Crandall
Under Submission; CCS'25.

[14] **Research Highlights: OpenVPN is Open to VPN Fingerprinting**
Diwen Xue, R. Ramesh, A. Jain, M. Kallitsis, J. Halderman, J. Crandall, and R. Ensafi
In: Communications of the ACM (January 2025 Issue) .

Service

- **TPC Member: USENIX'25, PETS'25, PETS'24, FOCI'25, FOCI'24**
- **Poster Chair: PETS'25**
- **Session Chair: PETS'24, FOCI'24**
- **External Reviewer: USENIX'23, USENIX'22**
- **Panelist, Explore Grad Studies in CSE 2023, UofM**
- **Administrator, Security Reading Group (SECRIT), UofM, (Sept 2021 - June 2022)**

Teaching

- **Guest Lecturer, University of Michigan**
  EECS-388 Introduction to Computer Security (Apr 2025)
- **Substitute Instructor & Graduate Student Instructor, University of Michigan**
  EECS-588 Computer & Network Security (Jan 2025 - Apr 2025)
- **Guest Panelist, University of California, Santa Cruz**
  CSE-253 Network Security (Oct 2024)

- **Graduate Student Instructor, University of Michigan**
  EECS-588 Computer & Network Security (Jan 2023 - Apr 2023)
- **Teaching Assistant, NYU**
  CSCI-310 Basic Algorithms, CSCI-480 Introduction to Computer Security (May 2019 - Jan 2020)

Experience

- **Research Intern, Cloudflare, Inc.** *(Jun 2023 - Oct 2023)*
  I explored QUIC's vulnerabilities to on-path network interference, such as injection attacks. I design and implement a large-scale monitoring system that provides packet-level visibility into QUIC traffic arriving at the CDN.
- **Research Assistant, University of Michigan** *(Jun 2020 - Present)*
  I work with my advisor Prof. Roya Ensafi as a Research Assistant. My work centers around empirical network security, measurement, and traffic analysis.
- **Research Assistant, New York University** *(May 2019 - August 2019)*
  I work with Prof. Joseph Bonneau as a Research Assistant to investigate the security of popular secure messaging protocol's key zeroization process.

Speaking

- **Guest Lecture: "Measuring and Characterizing Network Interferences"**
  EECS-388, Introduction to Computer Security, Ann Arbor, Michigan, April 9, 2025.
- **Conference Talk: "The Discriminative Power of Cross-layer RTTs in Fingerprinting Proxy Traffic"**
  NDSS 2025, San Diego, CA, February 25, 2025.
- **Conference Talk: "Fingerprinting Obfuscated Proxy Traffic with Encapsulated TLS Handshakes"**
  USENIX Security 2024, Philadelphia, PA, August 14, 2024.
- **Conference Talk: "Bridging Barriers: A Survey of Challenges and Priorities in the Censorship Circumvention Landscape"**
  USENIX Security 2024, Philadelphia, PA, August 14, 2024.
- **Invited Talk: "A Decade's Reflection on Russia's Evolving Censorship Landscape"**
  SplinterCon, 2023, Montreal, Canada, December 7, 2023.
- **Finalist Presentation: "Measuring and Circumventing Nation-state Network Censorship"**
  CSE Honors Competition, 2023, Ann Arbor, Michigan, November 11, 2023.
- **Workshop Talk: "Exploring the Use of Push Notifications in Censorship Circumvention"**
  FOCI 2023, Lausanne, Switzerland, July 10, 2023.

– **Invited Talk: "The Evolving Censorship Apparatus in Russia"**
WolvSec Club, Ann Arbor, Michigan, April 4, 2023.

– **TSPU: Russia's Decentralized Censorship System**
IMC 2022, Nice, France, October 25, 2022.

– **Conference Talk: "OpenVPN is Open to VPN Fingerprinting"**
USENIX Security 2022, Boston, MA, August 10, 2022.

– **Conference Talk: "Throttling Twitter: An Emerging Censorship Technique in Russia"**
IMC 2021, Virtual, October 23, 2021.