

Diwen Xue

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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. My interests include network security and Internet measurement, with an emphasis on traffic analysis and network filtering devices.

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

- **University of Michigan CSE Honors Competition - First Place** (November, 2023)
*The annual Honors Competition highlights outstanding research by Ph.D students.
My talk, “Measuring and Circumventing Nation-state Network Censorship” 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 USCanada 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’22 Distinguished Paper Award.

Refereed Conference Publications

- [1] **CryptoFilter: Privacy-Preserving Traffic Analysis of Weak Transport Layer Encryption at Internet Gateways**
B. Mixon-Baca, *Diwen Xue*, W. Wang, R. Ensafi, and J. Crandall
Under Submission; DIMVA'25.
- [2] **Blocking Resistant Communication for Censorship Circumvention using Push Notification**
P. Kumar, *Diwen Xue*, A. Ortwein, C. Bocovich, Harry, and R. Ensafi
Under Submission; PETS'25.
- [3] [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 .
- [4] [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 .
- [5] [USENIX'24] **Fingerprinting Obfuscated Proxy Traffic with Encapsulated TLS Handshakes**
Diwen Xue, M. Kallitsis, A. Houmansadr, and R. Ensafi
In: USENIX Security Symposium 2024 .
- [6] [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 .
- [7] [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 .
- [8] [FOCI'23] **The Use of Push Notification in Censorship Circumvention**
Diwen Xue and R. Ensafi
In: Free and Open Communications on the Internet, 2023 .
- [9] [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 .
- [10] [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**
- [11] [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.**

[12] [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

Blogpost available at <https://censoredplanet.org/throttling>

Teaching

- **Graduate Student Instructor, University of Michigan** (*Jan 2025 - Apr 2025*)
EECS-588 Computer & Network Security
- **Graduate Student Instructor, University of Michigan** (*Jan 2023 - Apr 2023*)
EECS-588 Computer & Network Security
- **Teaching Assistant, NYU** (*May 2019 - Jan 2020*)
CSCI-UA 310 Basic Algorithms, CSCI-UA 480 Introduction to Computer Security

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. I also develop analysis frameworks that identify several anomaly behaviors in QUIC traffic that potentially indicate attack, scanning, or interference.
- **Research Assistant,, University of Michigan** (*Jun 2020 - Present*)
I work with my advisor Prof. Roya Ensafi as a Research Assistant. My work centers around digital security, Internet measurement, and censorship study. I am currently working with ISPs to explore practical traffic fingerprinting attacks & defense mechanisms and apply the knowledge to improve proxy/VPN obfuscations adopted in the real world.

Service

- **TPC Member, USENIX Security Symposium 2025 (USENIX'25)**
- **TPC Member, Privacy Enhancing Technologies Symposium 2025 (PETS'25)**
- **TPC Member, Free and Open Communications on the Internet 2025 (FOCI'25)**
- **TPC Member, Privacy Enhancing Technologies Symposium 2024 (PETS'24)**
- **TPC Member, Free and Open Communications on the Internet 2024 (FOCI'24)**

- External Reviewer, USENIX Security Symposium 2023 (USENIX'23)
- External Reviewer, USENIX Security Symposium 2022 (USENIX'22)
- Session Chair at Privacy Enhancing Technologies Symposium 2024 (PETS'24)
- Session Chair at Free and Open Communications on the Internet 2024 (FOCI'24)
- Panelist, Explore Grad Studies in CSE 2023, UofM
- Administrator, Security Reading Group (SECRT), UofM, (Sept 2021 - June 2022)

Speaking

- **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.
- **OpenVPN is Open to VPN Fingerprinting**
USENIX Security 2022, Boston, MA, August 10, 2022.
- **Throttling Twitter: An Emerging Censorship Technique in Russia**
IMC 2021, Virtual, October 23, 2021.