Piyush Kumar

Postdoctoral Researcher
University of Michigan

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Research Interests

I work at the intersection of systems, network, security and privacy. Specifically, I develop frameworks, perform large-scale measurements, and build systems for deploying and facilitating the use of privacy-enhancing technologies to safeguard users' privacy.

Positions

- **Postdoctoral Researcher**, **University of Michigan**, Ann Arbor, US [October 2023–now]

  Working with: **Roya Ensafi**, Morris Wellman Associate Professor, University of Michigan

- **Postdoctoral Researcher**, **COSIC, KU Leuven**, Belgium [October 2021–September 2023]

  Worked with: **Claudia Diaz**. Associate Professor, KU Leuven and Chief Scientist, Nym Technologies

Education

- **PhD** in Computer Science (CGPA: 10/10), **IIIT Delhi**, India [2016-2021]

  Thesis Title: *Building Performant, Privacy-Enhancing, and Blocking-Resistant Communication Systems*

  Advisor: Sambuddho Chakravarty, Associate Professor and Head of Department

  Committee: Amir Houmansadr (UMass), Michalis Polychronakis (Stony Brook), and Kent Seamons (BYU)

- **M. Tech** in Computer Science (CGPA: 9.6/10), **IIIT Delhi**, India [2016-2018]

- **B. Tech** in Electronics & Communication (83.5% out of 100), **GGSIPU**, Delhi, India [2012-2016]

Awards

- **Outstanding reviewer** for PETS 2024.

- **FOCI Rising Star award** 2024. Awarded to "recognize the efforts of young and promising researchers who are contributing significantly to the advancement of the field through their innovative work and ideas".

- **Outstanding reviewer** for PETS 2023.

- **Doctoral dissertation award** for the PhD thesis (similar to summa cum laude).

Publications

[1] LAMP: Lightweight Approaches for Latency Minimization in Mixnets with Practical Deployment Considerations

Mahdi Rahimi, Piyush Kumar Sharma and Claudia Diaz.

Network and Distributed Systems Security Symposium (**NDSS**) 2025 [Acceptance rate: **15.04%** (150/997)]

[2] The Discriminative Power of Cross-layer RTTs in Fingerprinting Proxy Traffic

Diwen Xue, Robert Stanley, Piyush Kumar Sharma and Roya Ensafi

Network and Distributed Systems Security Symposium (**NDSS**) 2025 [Acceptance rate: **15.04%** (150/997)]

[3] LARMix: Latency-Aware Routing in Mix Networks

Mahdi Rahimi, Piyush Kumar Sharma and Claudia Diaz

Network and Distributed Systems Security Symposium (**NDSS**) 2024 [Acceptance rate: **20.20%** (140/694)]

[4] PTPerf: On the Performance Evaluation of Tor Pluggable Transports
Zeya Umayya, Dhruv Malik, Devashish Gosain and Piyush Kumar Sharma
ACM Internet Measurements Conference (**IMC**) 2023 [Acceptance rate: **25.87%** (52/201)]

[5] On the Anonymity of Peer-To-Peer Network Anonymity Schemes Used by Cryptocurrencies
Piyush Kumar Sharma, Devashish Gosain and Claudia Diaz
Network and Distributed Systems Security Symposium (**NDSS**) 2023 [Acceptance rate: **16.20%** (94/581)]

[6] Hades: Practical Partitioning Attack on Cryptocurrencies (Poster)
Vinay Shetty, Piyush Kumar Sharma, and Devashish Gosain
Network and Distributed Systems Security Symposium (**NDSS**) 2023

[7] Dolphin: A Cellular Voice Bases Internet Shutdown Resistance System
Piyush Kumar Sharma, Rishi Sharma, Kartikey Singh, Mukulika Maity and Sambuddho Chakravarty
Privacy Enhancing Technologies Symposium (**PETS**) 2023 [Acceptance rate: **21.85%** (123/563)]

[8] Camoufler: Accessing The Censored Web By Utilizing Instant Messaging Channels
Piyush Kumar Sharma, Devashish Gosain and Sambuddho Chakravarty
ACM Asia Conf. Computer and Communication Security (**AsiaCCS**) 2021 [Acceptance rate: **19.33%** (70/362)]

[9] SiegeBreaker: An SDN Based Practical Decoy Routing System
Piyush Kumar Sharma, Devashish Gosain, Himanshu Sagar, Chaitanya Kumar, Aneesh Dogra, Vinayak Naik, H.B. Acharya and Sambuddho Chakravarty
Privacy Enhancing Technologies Symposium (**PETS**) 2020 [Acceptance rate: **23.01%** (78/339)]

[10] The Road Not Taken: Re-thinking The Feasibility of Anonymous Voice Calling Over Tor
Piyush Kumar Sharma, Shashwat Chaudhary, Nikhil Hassija, Mukulika Maity, Sambuddho Chakravarty
Privacy Enhancing Technologies Symposium (**PETS**) 2020 [Acceptance rate: **23.01%** (78/339)]

[11] Maginot Lines and Tourniquets: On the Defendability of National Cyberspace
Devashish Gosain, Madhur Rawat, Piyush Kumar Sharma, H.B. Acharya
Local Computer Network (**LCN**) Symposium 2020

[12] Where The Light Gets In: Analyzing Web Censorship Mechanisms in India
Tarun Kumar Yadav, Akshat Sinha, Devashish Gosain, Piyush Kumar Sharma and Sambuddho Chakravarty
ACM Internet Measurement Conference (**IMC**) 2018 [Acceptance rate: **24.70%** (43/174)]

[13] SiegeBreaker: An SDN Based Practical Decoy Routing System (Work in Progress paper)
Piyush Kumar Sharma, Chaitanya Kumar, Aneesh Dogra, Vinayak Naik, H.B. Acharya and Sambuddho Chakravarty
Annual Computer Security Applications Conference (**ACSAC**) 2017

Ongoing Projects/Under Submission

[1] Blocking Resistant Communication for Censorship Circumvention using Push Notification
Piyush Kumar Sharma, Diwen Xue, Cecylia Bocovich, Aaron Ortwein, Harry and Roya Ensafi
Status: In progress and to be submitted soon

[2] Fingerprinting proxy traffic in adversarial network conditions by an active adversary
Wayne Wang, Diwen Xue, Piyush Kumar Sharma, Ayush Mishra and Roya Ensafi
Status: Under submission

[3] Comprehensively and systematically analyzing the security and privacy properties of mobile VPNs

Aaron Ortwein, Enrique Sorbodas, Wayne Wang, Afsah Anwar, Piyush Kumar Sharma and Roya Ensafi

Status: In progress and to be submitted soon

[4] Practically measuring the privacy-utility tradeoffs in payment channel networks

Satwik Prabhu, Piyush Kumar Sharma, Devashish Gosain and Stefanie Roos

Status: In progress and to be submitted soon

[5] Practical partitioning attacks on Bitcoin due to Tor hidden services

Piyush Kumar Sharma and Devashish Gosain

Status: In progress

Teaching Experience

- Delivered a **lecture on VPNs** as part of the Privacy Technologies course during at KU Leuven. Fall 2023

- Delivered a **lecture about peer-to-peer networks and their security properties** in the course *Advanced Privacy Technologies* at KU Leuven as part of the masters of cybersecurity program. Winter 2023

- **Managed and taught the complete course** *Privacy Technologies* at ESAT, KU Leuven. Fall 2022

- Co-managed and co-taught the course *Privacy and Big Data* at ESAT, KU Leuven Fall 2022

- Delivered a **four-hour seminar on Privacy courses** as part of the Advanced Masters of Cybersecurity program at KU Leuven in 2022. Fall 2022

- Delivered a **lecture on detailed and systematic overview of various (anti) censorship techniques** for the *Privacy Technologies* course at ESAT, KU Leuven. Fall 2021

- Served as a teaching assistant for different courses during my PhD. The courses included Systems Management, Numerical Methods, Network Security and Security Engineering.

- Served as the course instructor for multiple industrial certifications during my internship/part-time employment at CODEC Networks, including EC-Council's CND, CEH, ECSA and Cisco's CCNA. I taught students as well as corporate professionals for the aforementioned certifications for a duration of a year.

Invited Talks

- Presented an invited talk on developing effective solutions for Internet shutdowns. [Splintercon 2023]

- Delivered a **keynote at FOCI 2023** (co-located with PETS 2023) about the motivation and challenges of performing censorship research. [FOCI 2023]

- Presented my work on the analysis of peer-to-peer anonymity schemes used by cryptocurrencies. [Monerokon 2023]

- Delivered a seminar talk about privacy in peer-to-peer networks. [TU Delft 2022]

- Delivered an invited talk on SDN based decoy routing system for the security group. [University fo Michigan 2021]

Academic Service

- *Program Committee member:* USENIX Security 2025, PETS 2025, Euro S&P 2025, CCS 2024, WWW 2024, PETS 2024, WiSec 2024, FOCI 2024, PETS 2023, ESORICS 2022

- *External Reviewer:* PETS 2022, PETS 2021, ESORICS 2023

- *Session Chair:* Anonymity and Traffic Analysis Track (PETS 2023), Web Cookies Track (PETS 2024)

Intern Experience

- **R & D Intern at Pentester Academy** in Pune, India (February 2018 - April 2018)

  – My main work included research and development in VoIP and telephony technologies (SIP, RTP, RTCP, etc.). Built custom Wireshark plugins (packet dissectors) in Lua to display various VoIP characteristics and also for characterizing and displaying details of network protocols such as DHCP, ARP, etc.

  – I additionally built techniques for retrieving essential information (*e.g.,* chain of trust) about TLS and PKI certificates. I used this to detect Tor traffic in Wireshark itself.

- **Information Security Intern** at **CODEC Networks** in Delhi, India (July 2015 - August 2016)

  – Enforced network-wide security policies for different organizations using a centralized network security solution product "McAfee epo". The policies enforced included rules for Solidcore (Application Security), Drive Encryption, Removable Devices management, and DLP (Data Leakage Prevention).

  – Implemented a next-generation firewall UNTANGLE UTM on the network of various organizations. Further, I also worked on CISCO ASA Firewall and enforced security policies on a production network.

  – Being actively involved as an instructor, I delivered corporate training for security certifications like CEH, ECSA, CND, *etc.*