

# Piyush Kumar

Senior Research Fellow  
University of Michigan

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E-mail: [piyushks@umich.edu](mailto:piyushks@umich.edu)

<https://www.piyushs.in>

## Research Interests

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

- **Senior Research Fellow, University of Michigan**, Ann Arbor, US [October 2023–now]  
Working with: **Roya Ensafi**, Morris Wellman Associate Professor, University of Michigan  
Topic(s): Covert communication, VPN security and privacy
- **Postdoctoral Researcher, COSIC, KU Leuven**, Belgium [October 2021–September 2023]  
Worked with: **Claudia Diaz**, Associate Professor, KU Leuven and Chief Scientist, Nym Technologies  
Topic(s): Anonymity of peer-to-peer networks, anonymous communication systems

## Education

- **PhD** in Computer Science (CGPA: 10/10), **IIT 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)
- **Master of Technology** in Computer Science (CGPA: 9.6/10), **IIT Delhi**, India [2016-2018]
- **Bachelor of Technology** in Electronics & Communication (83.5% out of 100), **NSUT East Campus**, Delhi, India [2012-2016]

## Awards

- **FOCI Rising Star award**. It is given to “acknowledge and highlight the efforts of young and promising researchers who are contributing significantly to the advancement of the field through their innovative work and ideas.”.
- **Doctoral dissertation award** for the PhD thesis (similar to summa cum laude).
- **Outstanding reviewer** for PETS 2023 and PETS 2024.

## Publications

1. Mahdi Rahimi, **Piyush Kumar Sharma** and Claudia Diaz. “**LARMix: Latency-Aware Routing in Mix Networks**”, in Proceedings of Network and Distributed Systems Security Symposium (NDSS) 2024.
2. Zeya Umayya, Dhruv Malik, Devashish Gosain and **Piyush Kumar Sharma**. “**PTPerf: On the Performance Evaluation of Tor Pluggable Transports**”, in Proceedings of ACM Internet Measurements Conference (IMC) 2023.
3. **Piyush Kumar Sharma**, Devashish Gosain and Claudia Diaz. “**On the Anonymity of Peer-To-Peer Network Anonymity Schemes Used by Cryptocurrencies**”, in Proceedings of Network and Distributed Systems Security Symposium (NDSS) 2023.

4. Vinay Shetty, **Piyush Kumar Sharma**, and Devashish Gosain. “**Hades: Practical Partitioning Attack on Cryptocurrencies**”, Accepted as a **poster** in Network and Distributed Systems Security Symposium (NDSS) 2023.
5. **Piyush Kumar Sharma**, Rishi Sharma, Kartikey Singh, Mukulika Maity and Sambuddho Chakravarty. “**Dolphin: A Cellular Voice Bases Internet Shutdown Resistance System**”, in Proceedings of Privacy Enhancing Technologies (PETS) 2023.
6. **Piyush Kumar Sharma**, Devashish Gosain, Sambuddho Chakravarty. “**Camoufler: Accessing The Censored Web By Utilizing Instant Messaging Channels**”, in Proceedings of Asia Conference on Computer and Communications Security (AsiaCCS) 2021.
7. **Piyush Kumar Sharma**, Devashish Gosain, Himanshu Sagar, Chaitanya Kumar, Aneesh Dogra, Vinayak Naik, H.B. Acharya, Sambuddho Chakravarty. “**SiegeBreaker: An SDN Based Practical Decoy Routing System**”, in Proceedings of Privacy Enhancing Technologies (PETS) 2020.
8. **Piyush Kumar Sharma**, Shashwat Chaudhary, Nikhil Hassija, Mukulika Maity, Sambuddho Chakravarty. “**The Road Not Taken: Re-thinking The Feasibility of Anonymous Voice Calling Over Tor**”, in Proceedings of Privacy Enhancing Technologies (PETS) 2020.
9. Devashish Gosain, Madhur Rawat, **Piyush Kumar Sharma**, H.B. Acharya. “**Maginot Lines and Tourniquets : On the Defendability of National Cyberspace**”, Accepted for publication in Proceedings of Local Computer Network (LCN) Symposium 2020.
10. Tarun Kumar Yadav, Akshat Sinha, Devashish Gosain, **Piyush Kumar Sharma**, Sambuddho Chakravarty. “**Where The Light Gets In: Analyzing Web Censorship Mechanisms in India.**”, in proceedings of ACM Internet Measurement Conference (IMC), 2018.
11. **Piyush Kumar Sharma**, Chaitanya Kumar, Aneesh Dogra, Vinayak Naik, H.B. Acharya and Sambuddho Chakravarty. “**SiegeBreaker: An SDN Based Practical Decoy Routing System**”, Accepted as a poster in Annual Computer Security Applications Conference (ACSAC), 2017.

### Ongoing Projects/Under Submission

- The Role of Cross-layer RTTs in Fingerprinting Proxy Traffic (undergoing Major Revision at NDSS 2025)
- Lightweight approaches for reducing latency in mixnets with practical deployment constraints. (undergoing Major Revision at NDSS 2025)
- Blocking Resistant Communication for Censorship Circumvention using Push Notification (completed at the University of Michigan and to be submitted at an upcoming top security venue).
- Comprehensively and systematically analyzing the security and privacy properties of mobile VPNs (done at the university of Michigan and in the final stages. To be submitted at a top security venue).
- Fingerprinting proxy traffic in adversarial network conditions by an active adversary (done at the university of Michigan and in the final stages. To be submitted at a top security venue).
- Practically measuring the privacy-utility tradeoffs in payment channel networks (in collaboration with Stefanie Roos at TU Delft and TU Kaiserslautern).
- Practical partitioning attacks on Bitcoin due to Tor hidden services (in collaboration with Devashish Gosain at Max-Planck Institute of Informatics, Germany).

### Teaching Experience and Invited Talks

- Presented my work, Dolphin, on bypassing Internet shutdowns at Splintercon 2023 in Montreal, Canada.
- Delivered a lecture on VPNs as part of the Privacy Technologies course during fall 2023 at KU Leuven.

- Delivered a keynote at FOCI 2023 (co-located with PETS 2023) in Lausanne, Switzerland about the motivation and challenges of performing censorship research.
- Gave an invited talk at Monerokon 2023 in Prague about the analysis of peer-to-peer anonymity schemes used by cryptocurrencies.
- Gave a distinguished talk at TU Delft about privacy in peer-to-peer networks in 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 in Winter 2023.
- Managed and taught the complete course *Privacy Technologies* at ESAT, KU Leuven in Fall 2022.
- Co-managed and co-taught the course *Privacy and Big Data* at ESAT, KU Leuven in Fall 2022.
- Gave a four-hour seminar on Privacy courses as part of the Advanced Masters of Cybersecurity program at KU Leuven in 2022.
- Gave a lecture for the *Privacy Technologies* course at ESAT, KU Leuven in Fall 2021. The lecture was designed to provide a detailed and systematic overview of various (anti) censorship techniques.
- Gave an invited talk for the University of Michigan's security group during March 2021. I presented my research work on SDN based decoy routing system (which was published at PETS 2020).
- 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 an year.

## 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.*