Piyush Kumar

Postdoctoral Researcher
COSIC, KU Leuven

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Research Interests

Building privacy-enhancing technologies and contributing in the broad area of privacy, security and networks.

Education

- **Indraprastha Institute of Information Technology (IIIT)** — Delhi, India
  PhD in Computer Science — *2016 - 2021*

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

  - CGPA: 10/10

- **Indraprastha Institute of Information Technology (IIIT)** — Delhi, India
  Master of Technology in Computer Science — *2016 - 2018*

  - CGPA: 9.6/10

- **Ambedkar Institute of Technology, GGSIPU** — Delhi, India
  Bachelor of Technology in Electronics & Communication — *2012 - 2016*

  - Percentage: 83.5/100

Publications

1. **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.

2. **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.

3. **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.

4. **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.

5. **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.

6. 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.

7. 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.

8. **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.

Professional Experience

- **COSIC, KU Leuven**   Leuven, Belgium
  Postdoctoral Researcher   *October 2021–now (18 months)*
    - My work includes leading and collaborating on research projects, helping with teaching courses, and guiding Ph.D. as well as master students.
    - I worked on building a framework for analyzing the network-level anonymity of cryptocurrency systems using Bayesian inference.
    - Currently, I am working with and guiding a Ph.D. student to enable latency-aware routing in mix networks to support a wide range of Internet applications (a part of the work is under submission).
    - Working on multiple projects for enhancing the user experience as well as the security properties of the Nym network which is the first deployed and large-scale mixnet system.

- **Pentester Academy**   Pune, India
  R & D Intern   *Three months*
    - 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. Additionally, I also built some Wireshark plugins for characterizing and displaying details of network protocols such as DHCP, ARP, etc.
    - I also worked on TLS and PKI certificates and developed novel techniques to retrieve important information such as identifying self-signed certificates, retrieving chain of trust of Certifying Authorities (CAs), etc.
    - Additionally, I also developed plugins to detect Tor traffic in Wireshark itself.

- **CODEC Networks**   Delhi, India
  Information Security Intern   *12 months*
    - 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..*

Teaching Experience

- 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 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:* PETS 2024, PETS 2023, ESORICS 2022

- *External Reviewer:* PETS 2021, PETS 2022

Skills

- *Programming Languages:* C, C++, Python, Lua

- *Emulators/Simulators:* Mininet, DeterLab

- *Hardware:* Arduino, Raspberry pi, Intel Galileo, Zodiac-fx, HP3500yl SDN switch, Cisco networking devices

- *Certification:* EC-Council Certified Network Defender (CND)

Awards

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

- First prize in research showcase in IIIT Delhi (RIISE) for the research on Decoy routing and anonymous voice calls.