

# Piyush Kumar Sharma

PhD Scholar, Network Security Lab, IIIT Delhi, India  
Nationality: Indian

July 9, 2020

E-mail: [piyushs@iiitd.ac.in](mailto:piyushs@iiitd.ac.in)  
<https://www.piyushs.in>

## Research Interests

Building secure systems and contributing in the broad area of networks, systems, and security.

## Education

- **Indraprastha Institute of Information Technology (IIIT)** Delhi, India  
*PhD in Computer Science* 2016 - present
  - CGPA: 9.6/10
- **Ambedkar Institute of Technology, GGSIPU** Delhi, India  
*B. Tech, Electronics & Communication* 2012 - 2016
  - Percentage: 83.5/100

## Research Projects

- **SiegeBreaker: Deployable Decoy Routing using Software Defined Networks**  
*PETS 2020*
  - Decoy routing is a new approach that utilizes routers as proxies to serve censored content.
  - The research aimed at building a deployable decoy routing system using Software Defined Networks.  
Key design decisions:
    - Separation of Concerns: Dividing the task of Decoy Routing among different specialized modules.
    - Covert signalling mechanism: Identifying DR request by analyzing small fraction of traffic.
    - Using hardware routers (SDN switches)
    - Implementing flow and congestion control: To ensure reliability and good performance.
  - By virtue of our robust design, we succeeded in achieving:
    - 1.) Performance comparable to direct TCP downloads.
    - 2.) Privacy for clients who do not want their traffic to be inspected.
- **Achieving Untraceable Anonymous VoIP Calls Over the Internet**  
*PETS 2020*
  - No existing functional anonymous voice calling system.
  - Existing anonymity systems like Tor are deemed unsuitable for real-time applications like VoIP.  
However, no detailed study done yet.
  - Thus, studied Tor, by conducting an extensive and comprehensive study for shedding light on the feasibility of conducting VoIP calls over its network.
  - Conducted 0.5 million voice calls for a duration of 12 months using two setups.
    - The comprehensive study involved varying: 0.5 million Tor circuits (6650 Tor relays), Caller/Callee location across 7 countries, caller and(or) callee anonymity, Tor circuit lengths, VoIP codecs. Call duration, 3rd party applications such as Telegram and Skype, etc.
  - In contrast to prior belief, the study reveals that Tor currently provides a natural ecosystem for conducting VoIP calls.

## Publications

1. **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**”, Accepted for publication in Proceedings of Privacy Enhancing Technologies (**PETS**) 2020 (A top-tier venue in Privacy).
2. **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**”, Accepted for publication in Proceedings of Privacy Enhancing Technologies (**PETS**) 2020.
3. Tarun Kumar Yadav\*, Akshat Sinha\*, Devashish Gosain\*, **Piyush Kumar Sharma**, Sambuddho Chakravarty. “**Where The Light Gets In: Analyzing Web Censorship Mechanisms in India.**”, Accepted for publication in ACM Internet Measurement Conference (**IMC**), 2018. (\*Shared First Author).

## Professional Experience

- **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 wrote automated scripts in Python to retrieve important information such as identifying self-signed certificates, retrieving chain of trust of Certifying Authorities (CAs), etc.
  - As a side work, 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 scenario provided by the organization. Worked on CISCO ASA Firewall and enforced security policies on a production network.
  - Being actively involved as an instructor, I delivered corporate training for the organization including CEH, ECSA, CND, etc..

## Skills

- *Programming Languages:* C, C++, Python, Lua
- *Web Technologies:* HTML, CSS
- *Operating System:* Windows, Linux
- *Certification:* EC-Council Certified Network Defender(CND)