

# PRAGYA SHARMA

✉ pragyasharma@vt.edu 🏠 pragyasharmaa.github.io 💬 linkedin.com/in/pragya28 📚 Google Scholar

**Summary:** Ph.D. Candidate in ECE with 4+ years of research in 5G/6G system design, network security, and AI/ML for wireless networks. Previously 2+ years as a software engineer optimizing performance of DSP Processors.

## EDUCATION

<b>Virginia Tech</b>   Arlington, Virginia, USA <i>Ph.D. in Electrical and Computer Engineering (ECE)</i>	Jan 2021 – Dec 2026 (anticipated) GPA: 4.0/4.0
<b>Indian Institute of Technology Bombay</b>   Mumbai, India <i>B.Tech. &amp; M.Tech. in Electrical Engineering</i>	Jul 2013 – Jun 2018 GPA: 8.36/10.0

## WORK EXPERIENCE

<b>Futurewei Technologies</b>   Addison, Texas, USA <i>Wireless Research Intern, 5G Advanced/6G System Architecture</i>	May 2025 – Aug 2025
<ul style="list-style-type: none"><li>Designed and proposed novel enhancements to the 6G core network architecture, enabling QoS-aware sharing of beyond-connectivity services (e.g., sensing) between local subnetworks.</li><li>Formulated a QoS-aware optimization problem for service function selection in sensing-as-a-service use case; simulations demonstrated superior performance of the optimal solution over priority-only selection baseline.</li><li>Worked with the 3GPP SA2 standards team, conducting in-depth analysis of 3GPP technical reports and specifications to ensure alignment of proposed 6G core network enhancements with standardization efforts.</li></ul>	
<b>A2 Labs (formerly Kryptowire Labs)</b>   Arlington, Virginia, USA <i>Research &amp; Development Intern</i>	May 2022 – Aug 2022
<ul style="list-style-type: none"><li>Conducted stress-testing experiments to assess the scalability WAVE, a decentralized authorization framework, by deploying multiple WAVE client and server pods on a Kubernetes cluster.</li><li>Performed latency analysis to further integrate WAVE as an authorization mechanism in the 5G core network.</li></ul>	
<b>Cadence Design Systems</b>   Pune, India <i>Design Engineer II</i>	Jul 2018 – Dec 2020
<ul style="list-style-type: none"><li>Developed standardized libraries for Tensilica FixedPoint and FloatingPoint MathX Digital Signal Processors (DSPs) and optimized the code to achieve best possible performance of the DSPs.</li><li>Improved DSP core performance by optimizing the Instruction Set Architecture (ISA) of Tensilica ConnX DSPs, benchmarking performance improvements across GCC and LLVM C-compilers.</li><li>Contributed to the development of the neural network (NN) library of the Tensilica HiFi4 DSP to enhance Automatic Speech Recognition (ASR) capabilities of voice-controlled digital assistants.</li></ul>	

## PUBLICATIONS

1. **P. Sharma**, S. Sun, S. Deshpande, A. Stavrou, H. Wang. “Towards xApp Conflict Evaluation with Explainable Machine Learning and Causal Inference in O-RAN”. *IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN) 2025 (Best Paper Award)*
2. **P. Sharma**, A. Xiang, A. Kiani, J. Kaippallimalil, T. Saboorian, H. Wang. “CRSF: Enabling QoS-Aware Beyond-Connectivity Service Sharing in 6G Local Networks”. *Submitted to IEEE WCNC 2026*
3. S. Sun, **P. Sharma**, S. Maitra, A. Stavrou, H. Wang. “VulLens: Enhancing Software Vulnerability Detection against Evasion Attacks”. *Submitted to IEEE*
4. **P. Sharma**, T. Atalay, H. Gibbs, D. Stojadinovic, A. Stavrou, H. Wang. “5G-WAVE: A Core Network Framework with Decentralized Authorization for Network Slices”. *IEEE International Conference on Computer Communications (INFOCOM) 2024*
5. S. Sun, **P. Sharma**, K. Nwodo, A. Stavrou, H. Wang. “FedMADE: Robust Federated Learning for Intrusion Detection in IoT Networks Using a Dynamic Aggregation Method”. *Information Security Conference (ISC) 2024*
6. **P. Sharma**, J. Nair, R. Singh. “Adaptive Flow-Level Scheduling for the IoT MAC”. *International Conference on COMmunication Systems & NETworkS (COMSNETS) 2020*

## TECHNICAL SKILLS

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**Programming Languages:** C, C++, Python, Bash (Linux)

**AI/ML Packages:** scikit-learn, PyTorch, Gymnasium, SHAP, DoWhy

**AI/ML Techniques:** Reinforcement Learning, Federated Learning, Explainable AI, Deep Learning, Adversarial ML

**Network Simulation and Analysis:** OpenAirInterface (OAI), MATLAB, Wireshark

**Other Platforms and Tools:** Kubernetes, Docker, Gurobi Optimizer

## RESEARCH PROJECTS

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### Securing 5G Core Networks against Adversarial Attacks

(Ongoing)

- Investigated the security posture of AI-native 5G networks against adversarial attacks targeting the Network Data Analytics Function (NWDAF) within the 5G Core.
- Implementing targeted data poisoning and model evasion attacks in the 5G Core to quantify the degradation of network performance, with the aim of devising robust defensive strategies for efficient network automation.

### Conflict Evaluation of xApps in 5G O-RAN near-real-time RIC

- Designed a hybrid Explainable AI (XAI)-Causal Inference pipeline to detect xApp conflicts in O-RAN and measure their impacts on network KPIs.
- Implemented a Python-based ML stack for predictive modeling (XGBoost, RandomForest, MLP, SVR) on a MATLAB-simulated dataset. Evaluated the proposed workflow by utilizing SHAP for model explainability and DoWhy for causal effect estimation to generate interpretable insights for network operators.

### 5G-WAVE: Decentralized Authorization of Network Functions (NFs) in 5G core

- Designed a decentralized authorization framework for service access among NFs in the 5G core service-based architecture to eliminate security vulnerabilities caused by OAuth-based central authorization.
- Implemented the 5G-WAVE system design by modifying an end-to-end OpenAirInterface (OAI) 5G core Kubernetes deployment. Developed WAVE-SCP (in C++) and Redirection-SCP (in Python) and deployed them as side-car proxy containers attached to native OAI NF pods for service authorization and verification.
- Conducted extensive latency analysis to measure authorization overhead in 5G service requests.

### Robust Federated Learning for Intrusion Detection in IoT Networks

- Co-designed a dynamic aggregation method for combining local federated learning (FL) models of IoT devices with adaptive weights to address device heterogeneity, thus improving attack classification of minority attack classes in a federated intrusion detection system (IDS).

## AWARDS AND ACHIEVEMENTS

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**Best Paper Award**, IEEE NFV-SDN (2025)

**Pratt Fellowship**, ECE, Virginia Tech (2024, 2026)

**Student Travel Grant**, IEEE INFOCOM (2024)

**Institute Organizational Color**, IIT Bombay (2016)

**All India Rank (AIR) 192**, out of 1.4 million candidates in the IIT-JEE Advanced Exam (2013)

## SELECTED COURSEWORK

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Deep Learning, Reinforcement Learning, System and Software Security, Network Security, Fundamentals of Information Security, Markov Chains and Queuing Systems, Communication Networks, Wireless and Mobile Communications, Blockchain Technologies

## LEADERSHIP ROLES

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**Campus Representative, Arlington** (2022)

*Virginia Tech Graduate Student Assembly (VT-GSA)*

**President, Washington DC Chapter** (2022–24)

*IIT Bombay Heritage Foundation (IITB-HF)*