

Sripath Mishra

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ML Engineer — Anomaly Detection, Low-Latency ML & Explainable AI

Detection pipelines for edge and distributed systems: millisecond inference budgets, drift-resistant retraining, and model decisions operators can audit.

Skills

Machine Learning: anomaly detection, deep learning, **explainable AI (XAI)**, GNNs, federated/distributed learning, RAG / retrieval systems, sequence modeling

ML Engineering: PyTorch, TensorFlow, **low-latency inference**, edge deployment, training & evaluation pipelines, data pipelines, large-scale dataset generation, experiment design

Systems & Security: intrusion detection, traffic analysis & classification, network telemetry, digital-twin simulation, adversarial evaluation, UAV/FANET security

Languages & Tools: Python, C++, Java, JavaScript; Git, Linux, Docker, REST APIs, network simulation, FPGA prototyping

Research Experience

Low-Latency Anomaly Detection for Edge Systems

Purdue University

Research Assistant, Prof. Bharat Bhargava's group

Jan 2025 – Present

- Engineered FlowRAG, an edge-cloud detector built on the finding that on-device latency, not accuracy, is the binding constraint for edge deployment: an on-device screen clears **90% of flows** in **4.78 ms** (P99 6.16 ms) on a Raspberry Pi 4B, escalating only ambiguous flows — **+16% F₁** over the strongest baseline under mobility drift (IEEE EDGE 2026).
- Redefined RAG for detection: retrieval regenerates training sets instead of text, so the detector absorbs new attack variants without catastrophic forgetting — **+7–10 F₁ points** over baselines (0.81–0.82 vs. 0.72–0.75) across 5–20-UAV swarms.
- Created UAV-CAS, a **99,492-flow** digital-twin dataset calibrated against real AERPAW hardware to **0.33 Hellinger** divergence. Benchmarking 10 IDS exposed a field-wide blind spot: binary detection saturates above 0.98 while stealth-paired collaborative attacks collapse to **0.51–0.86 AUROC** (arXiv:2606.17845).
- Designed the first interpretable two-level detector recovering collaborative attack sets from scenario-level labels: cross-flow synchrony and destination-convergence features reach **0.88 set-precision**, with named-threshold rules explaining the flood classes at **0.94–0.99 F₁**, each mapped to an operator mitigation. 10-packet prefixes land within 2 points of full-flow accuracy (under submission).

Robust Traffic Classification Under Distribution Shift

Purdue University

Research Assistant, Prof. Sonia Fahmy's group

2023 – 2025

- Built a testbed isolating one network factor at a time — 10 Dockerized services, five application classes from video streaming and conferencing down to email and FTP, **500 workload runs** — and used it to show augmentation is method-specific: identical methods gained size-sequence classifiers up to **+18 F₁** while costing timestamp-based ones as much as 24 points (IEEE IPCCC 2025).

Near-Switch Network Telemetry (NetEye)

Purdue University

Research Assistant, NextGArchLab

2022 – 2023

- Broke the accuracy-scalability tradeoff in hybrid telemetry by replacing single-stream iterative refinement with near-switch window replay through every query: **F₁ 0.96–0.99** vs. 0.73–0.83 for the Sonata baseline across 15+ concurrent queries.
- Engineered a Delta+Huffman+LZ78 compression pipeline on FPGA to make replay affordable — header storage cut **92%** (12.5:1) — and moved monitoring logic near-switch, dropping data-plane updates from 470 μ s to **20 μ s**.

Team Lead, CAM2 Lab — 57,364 cameras extracted from 237,257 pages, 98.7% precision (ACM TOIT 2021)

2018–20

Industry Experience

SWE Intern, Carbonite — VM tooling in C#; Jenkins, vSphere/vCenter, PowerShell

2019

SWE Intern, NextGear Capital (Cox) — rebuilt events server + React client over Postgres/Spark, Dockerized

2018

Education

Purdue University

Ph.D. in Computer Science (Advisor: Prof. Bharat Bhargava)

West Lafayette, IN

Jan 2022 – May 2027 (expected)

University of California, Los Angeles

M.S. in Computer Science

Los Angeles, CA

Dec 2021

Purdue University

B.S. in Computer Science (Honors); Dean's Honor List; Best Sophomore Award in CS

West Lafayette, IN

May 2020

Publications

3 first-author of 5 — full list: Google Scholar

- IEEE EDGE 2026** — FlowRAG: A Two-Stage Retrieval-Augmented Intrusion Detection System for Adaptive UAV Network Security
- arXiv:2606.17845** — UAV-CAS: A Calibrated Digital-Twin Dataset for Intrusion Detection in UAV Swarm Networks
- IEEE IPCCC 2025** — Enriching Network Traffic Traces for Increasing Classification Accuracy
- ACM TOIT 2021** — Automated Discovery of Network Cameras in Heterogeneous Web Pages
- IEEE COMPSAC 2020** — A Real-Time Feature Indexing System on Live Video Streams