Subangkar Karmaker Shanto

West Lafayette, Indiana, US
sshanto@purdue.edu · subangkar.github.io · Google Scholar · LinkedIn

CS Ph.D. candidate at Purdue with research interests in Network Security and LLM security with hands-on RL/LLM/ML/NLP and systems experience; built and deployed PyTorch models (LLMs, RL, RAG, Bayesian DL), ran data/ML pipelines on AWS with Docker, published at UbiComp, and code in Python, C++, and Java.

RESEARCH INTEREST

LLM - Network and Systems Security - Cellular Security

EDUCATION

Purdue University, Indiana, US — Aug 2024 - Present
Ph.D. in Computer Science
Advisor: Dr. Elisa Bertino, Samuel D. Conte Professor of Computer Science

Bangladesh University of Engineering & Technology (BUET), Dhaka, Bangladesh — 2021
B.Sc. in Computer Science and Engineering
Thesis: Atrial Fibrillation Detection from Noisy Photoplethysmography Signals
CGPA: 3.88/4

PUBLICATIONS

- **BayesBeat: Reliable Atrial Fibrillation Detection from Noisy Photoplethysmography Data [Co-first author; equal contribution]** – *UbiComp '22*
- **IPBlocks: a Blockchain Ecosystem for Secure IP Registration and Decentralized Marketplace** – *TENCON '25*

RESEARCH & PROJECT EXPERIENCE

Adversarial Malware Variant Generation via Reinforcement Learning
- *Focus:* Generate adversarial variants of malware samples to evade detectors
- *Method:* Using GRPO, PPO and Actor-Critic to modify existing malware to evade the Malware detectors
- *Stack/Code:* PyTorch, Python

Security Analysis of 5G Control Plane Protocols
- *Focus:* Analyze and uncover security flaws in 5G control-plane protocols particularly in the PHY/MAC layer
- *Testbed:* Implemented a mini-base station testbed by modifying open source radio stacks; enabled asynchronous injection of protocol messages into smartphones over a 5G network.
- *Outcome:* Identified vendor-specific deviations from 3GPP standards and their potential security implications.
- *Stack/Code:* C/C++, Java, Open5GS core, srsRAN, OpenAirInterface

BayesBeat: Reliable Atrial Fibrillation Detection from Noisy Photoplethysmography Data
- *Problem:* PPG signals are often noisy due to motion artifacts; require reliable prediction with uncertainty estimates.
- *Method:* Built a Bayesian deep learning model in Python (PyTorch) that outputs calibrated uncertainty alongside predictions.
- *Results:* Surpassed the prior state of the art by **7–25%** on the largest public dataset and **10–14%** on MIMIC-III; first application of Bayesian deep learning in this domain.
- *Publication:* Accepted at UbiComp 2022; published in IMWUT (dl.acm.org/doi/abs/10.1145/3517247).
- *Stack/Code:* Python, PyTorch

Contrastive Learning Based Approach for Patient Similarity
- *Idea:* Learned patient similarity from physiological (PPG) signals via contrastive learning.
- *Contributions:* Designed a new contrastive loss; conducted a case study on atrial fibrillation detection due to limited data; first application of contrastive similarity learning in this domain.
- *Preprint:* arxiv.org/pdf/2308.02433
- *Stack/Code:* Python, PyTorch

AI Generated Text Detection using Adversarial Learning
- *Idea:* Detect AI-generated text via an adversarial setup between a classifier and a paraphraser.
- *Method:* Implemented an adversarial loop where a `distilBERT` detector competes with a `T5-small` paraphraser trained via PPO and hybrid back-translation/lexical rewrites.
- *Results:* Optimized training speed by 4 times by caching corpus generation and using PyTorch `DataParallel` to overcome GPU memory limits.
- *Stack/Code:* Python, PyTorch, HuggingFace, NLTK

SDN Delay/Jitter Prediction via GNN
- *Focus:* Predict per-flow delay and jitter in SDN using graph-based models.
- *Setup:* Containerized ONOS+Mininet on an AWS VM and scripted a generator that produced 540 labelled simulations.
- *Data:* Logged per-flow delay, jitter, and loss via D-ITG and captured 27 routing matrices, all marshalled by a Docker-based

data-collection pipeline.
- *Stack/Code:* ONOS, Mininet, D-ITG, Python, Bash, Docker

FoodSquare: Multi-Tenant Restaurant Marketplace
- *Goal:* Build a multi-tenant marketplace for restaurants and customers.
- *Features:* Developed an end-to-end Django platform with restaurant self-service menus and real-time search & checkout for customers.
- *Deployment:* Containerized solution pushed to Docker Hub for one-command deployment.
- *Stack/Code:* Python, Django, PostgreSQL, Docker

WORK EXPERIENCE

Graduate Research/Teaching Assistant — Dept. of CS, Purdue University Aug 2024 – Present
- Working in a cellular security research project to find vulnerabilities in 4G/5G systems under supervision of Dr. Elisa Bertino and Dr. Imtiaz Karim
- Mentored 500+ students in Programming as TA; conducted weekly labs, supervised team projects and held debugging sessions

Lecturer — Dept. of CSE, United International University (UIU) 2021 – Jul 2024
- Delivered core CS courses (Algorithms, AI, Networks, C/C++/Java/Python) for 1000+ students
- Mentored student teams to win Gold at the 2023 International Blockchain Olympiad
- Organized and set problems for tri-semester project/ML competitions

Research Assistant — DataLab, BUET 2019 – 2021
- Built and deployed Tizen/Django based data-collection system that logged patient records across hospitals for a government-funded public-health study

AWARDS

- ▶ Supervisor of the Gold Winner team among 50 global teams, International Blockchain Olympiad, Amsterdam (2023)
- ▶ Winner, National Hackathon on Frontier Technologies (2020)
- ▶ Theme winner, Blockchain Olympiad BD (2021)
- ▶ University Merit Scholarship (2017–19) and Dean's List (2016–19), BUET

TECH SKILLS

Machine Learning & NLP: LLMs (prompting/fine-tuning), Reinforcement Learning, RAG; PyTorch, Keras, scikit-learn, Pandas, NLTK
Programming: Python, Java, C/C++, Bash, x86 Assembly
Backend & Data: Django & Django REST for model-serving APIs; relational data modeling with PostgreSQL & MySQL
MLOps & Reproducibility: Git/GitHub, Docker
Cloud (AWS): EC2, IAM
Systems: Linux, libpcap, Wireshark, Packet Tracer

REFERENCES

Dr. Elisa Bertino
Samuel D. Conte Professor, Department of Computer Science
Purdue University
E-mail: bertino@purdue.edu

Dr. Imtiaz Karim
Assistant Professor, Department of Computer Science
The University of Texas at Dallas
E-mail: imtiaz.karim@utdallas.edu

Dr. Atif Hasan Rahman
Associate Professor, Department of Computer Science and Engineering
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh
E-mail: atif.bd@gmail.com