Partho Adhikari

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Education

National Yang Ming Chiao Tung University – Hsinchu, Taiwan **Sept 2023 – Jun 2025**
M.S. in Electrical Engineering & Computer Science *CGPA: 4.06 / 4.3*
Coursework: Data Mining, Machine Learning, Deep Learning, Data Visualization & Analytics
Video Compression, Memory & Storage Systems

Vel Tech Technical University – Chennai, India **Jul 2019 – May 2023**
B.Tech in Electronics & Communication Engineering *CGPA: 8.58 / 10*

Experience

Graduate Research Assistant **Sept 2023 – May 2025**
High Speed Network Lab — NYCU, Hsinchu, Taiwan

- Conducted applied research in **Operational Technology (OT) Security** for **Cyber-Physical Systems (CPS)**, focusing on anomaly detection in industrial control networks.
- Simulated ICS threat scenarios using the **MITRE ATT&CK for ICS** framework, including reconnaissance, DDoS, replay, and MITM attacks.
- Participated in national and international **Capture The Flag (CTF)** cybersecurity competitions, ranking **16th/297** (ASIS CTF) and **114th/959** (UIU CTF).
- Delivered ongoing research documentation, weekly technical reports, and conference-style presentations over a 2-year research cycle.
- **Key Skills:** Anomaly Detection, Traffic Analysis, Protocol Inspection (Modbus, TCP/IP), Log Correlation, ICS Security

Data Science Intern **Sept 2022 – Nov 2022**
Happymonk.ai — Bangalore, India

- Built deep learning models for **face recognition**, **road crack detection**, and **object detection** using **YOLOv5** and **YOLOv7**.
- Labeled large-scale datasets with **LabelImg** and **Labelme**, applying image augmentations (rain, fog, blur) using **OpenCV** to improve model robustness.
- Automated the full data pipeline: video capture, frame extraction, and preprocessing, significantly accelerating model training workflows.
- **Key Tools:** Python, PyTorch, OpenCV, CNNs, YOLO, LabelImg, Labelme

Projects

ICS Threat Hunter Agent – Offline LLM Assistant for Industrial Cybersecurity **GitHub Link**

- Developed a secure, offline-compatible **LLM assistant** for ICS incident response using Mistral 7B via Ollama, enabling usage in air-gapped environments without cloud or API access.
- Built a **retrieval-augmented pipeline** with LangChain tool-using agents and FAISS (vector similarity search) to surface relevant threats from 4,000+ real-world ICS breach records.
- Processed unstructured cybersecurity data from the Verizon Data Breach Database (VCDB) into a searchable, vectorized format to support semantic Q&A and threat analysis.
- Combined structured YAML-based response scenarios with LLM fallback logic and few-shot prompting—delivering **adaptive and explainable incident mitigation strategies**.
- **Tech Stack:** Python, LangChain, Ollama, Docker, Kubernetes, AWS EC2, Prompt Engineering, LLM Orchestration

Two-Stage Anomaly Detection for Industrial CPS using Multi-Source Data **GitHub Link**

- Simulated real-time **cyberattacks and system faults** in industrial control systems (ICS) using a custom emulator with **multi-source data**—network traffic, syslogs, and sensor readings.
- Built a data processing pipeline: converted raw **pcap** files to network flows, transformed syslogs with **TF-IDF**, and structured sensor data into time series for ML ingestion.
- Designed a **two-stage anomaly detection framework** leveraging one-class learning to model normal behavior and isolate cyberattack-induced faults from benign anomalies.
- Conducted model evaluation across OCSVM, Isolation Forest, LOF, and Autoencoder; achieved **99% F1-score** with OCSVM using all data sources.
- **Tech Stack:** Python, TensorFlow, Scikit-learn, Optuna, ICSFlowGenerator, NLP, Docker, Wireshark, Kali Linux

Interactive Dashboard – Global Refugee Migration Trends (UNHCR Data) **GitHub Link**

- Developed a web-based dashboard to visualize **global refugee movements** using UNHCR data, enabling filtering by country, year, and region to uncover migration trends and inform policy.

- Designed **coordinated visualizations**—choropleth maps, time-series plots, bar charts, and Sankey diagrams—with dynamic tooltips, brushing, and linked views for intuitive, multi-faceted analysis.
- Streamlined deployment using **CI/CD with GitHub Actions**, hosting on GitHub Pages for automatic updates with no manual intervention.
- **Tech Stack:** D3.js, JavaScript, HTML, CSS, Git, GitHub Actions, GitHub Pages

Publication

Real-Time Safety Helmet Detection Using Deep Neural Networks ***SSRG IJEEE, Vol. 11, Issue 5, May 2024***

- Developed a deep learning-based object detection system for **real-time safety compliance** in industrial environments, using a custom-labeled helmet dataset.
- Improved detection accuracy and robustness under variable lighting through **data augmentation** and **transfer learning**.
- Deployed an optimized **YOLOv8l** model on edge hardware, achieving **95% mAP** at **30 FPS** on live surveillance feeds.

Training

AWS Data Engineering Bootcamp **May 2025 – Present**

Data Engineering Hub — Remote (Georgia, United States)

- Enrolled in a 90-day, project-based program focused on building scalable **cloud data engineering** solutions using AWS.
- Designing secure ETL workflows with **AWS S3**, **IAM**, **KMS**, and **Athena**; automating pipelines using **AWS Lambda**.
- Solving real-world problems in weekly hackathons, focused on data ingestion, transformation, and pipeline orchestration.
- Gaining hands-on experience with **AWS Glue**, **PySpark**, and large-scale distributed processing.

Skills

Programming:	Python, SQL, C/C++, R, MATLAB
Machine Learning:	TensorFlow, Keras, PyTorch, Scikit-learn
LLMs & Applied NLP:	Prompt Engineering, RAG, Langchain, Agentic Flow
Cloud:	AWS (S3, IAM, KMS, Athena, Lambda, Glue), ETL/ELT Pipelines
Data Analysis:	Pandas, NumPy, Matplotlib, Seaborn, Tableau
DevOps & Tools:	Git, Docker, Kubernetes Linux, macOS, Windows
Professional Skills:	Self-driven, Accountable, Strong Team Collaboration
Languages:	English (Fluent), Bengali (Native), Hindi (Fluent), Chinese (Beginner)

References

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Dr. Yuan-Cheng Lai
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