

# Swarat Sarkar

New York, NY | swaratsa@buffalo.edu | +1 (716) 923-5427 | linkedin.com/in/swarat17 | github.com/swarat17

## Summary

Software and AI engineer with 2+ years building production systems achieving >99.5% accuracy and applications serving 25k+ users. Expert in Python, machine learning frameworks, and cloud platforms for delivering end-to-end solutions with measurable business impact including 40% operational improvements and systems processing 30M+ daily transactions.

## Education

University at Buffalo | Buffalo, NY, USA

August 2024 – December 2025

Master of Science, Engineering Science – Artificial Intelligence | CGPA: 3.83/4.0

Indian Institute of Technology Hyderabad | Hyderabad, India

July 2018 – May 2022

B.Tech, Mechanical and Aerospace Engineering | CGPA: 8.1/10

## Work Experience

Research Assistant | UB Safe and Efficient Autonomous Systems Lab | Buffalo, NY, USA

July 2025 – Present

- Architecting **Computer Vision pipeline** in **ROS2** with **LECSFormer transformers** on autonomous vehicles for bridge crack segmentation and length quantification, enabling real-time monitoring through **vehicle-to-everything (V2X)** technology.
- Engineered **training pipeline** with density-aware augmentation and semi-automatic annotation to extract **pixel-accurate crack masks** from 443 dashcam images, achieving **89% F1 improvement** and **247% precision gain** via dynamic cropping.
- Co-authored conference paper “Infrastructure-Guided Connectivity-Enhanced Road Crack Detection and Estimation” submitted to **IEEE MOST 2026**.

ML Engineer (Capstone Project) | Nissha Medical Technologies | Buffalo, NY, USA

September 2025 – December 2025

- Pioneered **AI-driven Inspection System** using **YOLOv8s-TensorRT** achieving **>99.5% defect detection** with 84ms inference.
- Delivered **real-time quality dashboard** with root cause analysis for 30M+ daily casino tickets, addressing **4% defect rate** with **automated multi-gate inspection** (count, visibility, density, alignment), enabling waste reduction and scalable deployment.

Manager IT Network and Communication | TATA STEEL Limited | Jamshedpur, India

April 2023 – August 2024

- Engineered **Python-based analytics pipeline** processing **110k+ network incidents** using **Pandas, NumPy**, and statistical modeling, developing predictive insights that reduced outages by **40%** and decreased support call volumes by **25%**.
- Designed **real-time monitoring platform** integrating **4 REST APIs (OPManager, HP Aruba, Cisco Meraki, ServiceNow)** with **Python backend** and **Tableau frontend**, delivering executive dashboards for **CIO weekly reports** and achieving 100% asset coverage across **16,000+ devices** with **99.5% uptime**.
- Developed **suite of automation tools** using **Python and Power Apps**, including bulk email dispatch, contract alerting, asset ID automation, and inventory management platform, streamlining workflows for **1,000+ users**.

Management Trainee Systems | TATA STEEL Limited | Remote

August 2022 – April 2023

- Built a responsive web app using **ReactJS, ExpressJS, Google Maps API**, and **Microsoft SQL** to assist 25k+ users with **real-time bus tracking** and customized maps generated from routes, improving commute in the steel plant.
- Initiated analytics pipelines using **Python, R**, deployed cloud ML workflows on **GCP, AWS** with **scikit-learn, TensorFlow**, and created full-stack apps using **C#, Java, JavaScript, ReactJS, .NET**, and databases (**SQL Server, Oracle, MongoDB**).

## Projects

Business Intelligence Assistant | *Elasticsearch, Sentence-BERT, FastAPI, LangChain, Gemini API, n8n, RLHF*

- Built a **RAG-based assistant** that ingests, translates, and embeds competitor news, enabling **semantic retrieval with 90% relevance** and decision-support Q&A with citations, while leveraging **RLHF feedback** to prioritize high-value insights.

RL-Guided Curriculum Learning Pipeline | *PyTorch, Hugging Face Transformers, Gymnasium, BERT, PPO*

- Devised a custom **Gymnasium environment** and **PPO-based curriculum learning pipeline** that **learns sample difficulty online** and orders training data from easy to hard, resulting in **~60% faster convergence** for LLM-based text classification.

Real-Time Soccer Offside Detection | *YOLOv8, OpenCV, Computer Vision*

- Developed offside-detection system converting YOLOv8 player/field boxes into geometric field lines using a custom **SVD-based vanishing-point solver**, and **HSV team classification**, achieving >20 FPS and **95% accuracy** on consumer GPUs.

## Skills

**Programming & AI:** C/C++, Python, MATLAB, Java, C#, R; Frameworks (TensorFlow, Keras, PyTorch, Gym, XGBoost); Deep Learning (CNNs, RNNs, Autoencoders); Reinforcement Learning (DQN, A3C, PPO); Generative AI (VAEs, Transformers, Diffusion)

**Big Data & Data Science:** Apache Spark (SQL, MLlib, GraphX), PySpark, Hadoop, Kafka; pandas, NumPy, matplotlib, scikit-learn

**Cloud, DevOps & OS:** GCP, AWS, Azure; Docker, Kubernetes; CUDA, TensorRT; Jupyter Notebook, VS Code, Git, Postman; Linux

**IoT & Computer Vision:** NVIDIA Jetson, Raspberry Pi, Arduino; OpenCV, ROS2, YOLO, CVAT; Visualization (Tableau, PowerBI)

## Awards & Certifications

**Awards:** NASA Lunabotics 2025 - Best Presentation Award | Tata Steel - Suri Seva Foundation Award (2nd/200+ trainees)

**Certifications:** AWS Certified AI Practitioner, DeepLearning.AI TensorFlow Developer Specialization