

Swarat Sarkar

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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
<ul style="list-style-type: none">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
<ul style="list-style-type: none">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
<ul style="list-style-type: none">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
<ul style="list-style-type: none">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 <i>Elasticsearch, Sentence-BERT, FastAPI, LangChain, Gemini API, n8n, RLHF</i>	
<ul style="list-style-type: none">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 <i>PyTorch, Hugging Face Transformers, Gymnasium, BERT, PPO</i>	
<ul style="list-style-type: none">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

- 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