

ARJUN DESUR

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Education

National Institute of Technology, Warangal

2022 – 2026

Bachelor of Technology in Electronics and Communication Engineering

Warangal, India

Relevant Coursework: *Machine Learning, Data Structures & Algorithms, Computer Architecture, Operating Systems, Data Networks, Cryptography, Probability Theory & Stochastic Processes, Microprocessors*

Experience

NIT Warangal (National Institute of Technology, Warangal)

May - July (2025)

Machine Learning Summer Intern

Warangal, India

- Developed a deep learning framework for military aircraft classification by integrating ResNet-50 and EfficientNet with multi-transformation feature fusion (PCA, KPCA, SVD, ICA, LDA) and XGBoost, achieving 99.33% accuracy on the MTARSI dataset and outperforming prior CNN-based approaches. Published at IEEE ICONAT 2025.

IIT Madras (Indian Institute of Technology, Madras)

May - July (2024)

Machine Learning Summer Intern

Chennai, India

- Built Python scripts for a computer vision pipeline at TrityAEye (IIT Madras ITS Lab) to filter ML algorithm output files by vehicle category, automate frame extraction from 100+ surveillance videos, and annotate 2000+ vehicle images across multiple truck classes using LabelMe; validated object detection outputs by cross-referencing tracking data against ground truth footage, supporting a model achieving $\geq 95\%$ classification accuracy.

Digital Signal Processing Lab, NIT Warangal

Aug - Oct (2023)

Machine Learning Researcher

Warangal, India

- Proposed a hybrid Glowworm Swarm Optimization and K-Means clustering algorithm (KM-GSO) for color image quantization, achieving PSNR of 26.10 dB and SSIM of 0.92 vs. 14.88 dB and 0.17 for standard K-Means (K=64), outperforming 5 benchmark methods on the Kodak dataset. Applied to Chandrayaan-3 mission images, achieving SSIM of 0.96. Published at IEEE ICPC2T 2024.

Projects

Autonomous AI Agent with Tool Use (ReAct Framework) | Python, LangChain, Groq API, ReAct

Mar 2026

- Built an LLM-powered autonomous agent using the ReAct (Reason + Act) loop with LangChain, dynamically routing across 3 tools - web search (Tavily API), Python code execution, and document retrieval - based on real-time query intent to automate complex multi-step reasoning tasks.
- Evaluated across 150+ multi-domain test prompts with avg. response latency of 380ms via Groq API (Llama 3); agent resolved multi-step queries end-to-end with no manual intervention via a CLI interface.

Credit Card Fraud Detection using Machine Learning on AWS | Python, AWS SageMaker, REST API

Feb 2026

- Trained XGBoost (supervised) and Random Cut Forest (unsupervised) models on highly imbalanced transaction data (200,000+ records, 492 fraud cases); applied SMOTE oversampling and threshold tuning to address class imbalance and optimize minority class detection.
- Achieved 92% recall on the fraud class; deployed models via SageMaker endpoints and exposed through a REST API for real-time transaction scoring in a production-like environment.

RAG-Powered Document Q&A Chatbot | Python, LangChain, FAISS, Ollama, Streamlit

Oct 2025

- Designed an end-to-end Retrieval-Augmented Generation pipeline over 50+ PDF documents using LangChain, FAISS, and Ollama (Llama 3); implemented recursive chunking (512-token chunks, 64-token overlap), nomic-embed-text embeddings, and cosine similarity retrieval to enable fully offline semantic search.
- Deployed a Streamlit UI supporting natural language Q&A with context-aware responses, achieving sub-3s query latency across 200+ test queries - eliminating manual document lookup for local knowledge bases.

Publications (IEEE Xplore)

Enhanced Color Image Quantization Using Hybrid Glowworm Swarm Optimization and K-Means Clustering

IEEE ICPC2T, Jan 2024. [Link to Paper]

Enhanced Military Aircraft Classification Using ResNet and EfficientNet with Multi-Transformation Feature Fusion and XGBoost

IEEE ICONAT 2025, Cosponsored by IEEE Bombay Section, Sep 2025. [Link to Paper]

Technical Skills

Languages: Python, SQL, C++, HTML/CSS

ML & AI: PyTorch, Scikit-learn, XGBoost, HuggingFace Transformers, LangChain, FAISS, Ollama, OpenCV

Frameworks & Tools: FastAPI, Flask, Streamlit, REST APIs, Git, Jupyter, NumPy, Pandas

Cloud & DevOps: AWS (SageMaker, EC2, S3), Docker, Linux