AHALYA RAJAN

M.Tech CSE (AI & ML) · VIT Vellore

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PROFESSIONAL SUMMARY

M.Tech AI & ML researcher at VIT Vellore with 4× peer-reviewed publications (IEEE & Springer). Skilled in building end-to-end intelligent systems: trustworthy deep learning, NLP pipelines, federated learning, and real-time deployments. Strong foundation in Python, SQL, MLOps, and data engineering with emphasis on explainability and production-grade reliability.

EDUCATION

M.Tech – Computer Science & Engineering (AI & ML) | CGPA : 8.54 2025 – 2027
Vellore Institute of Technology, Vellore, Tamil Nadu

B.Tech – Artificial Intelligence & Machine Learning 2021 – 2025
Kongu Engineering College, Erode, Tamil Nadu

TECHNICAL SKILLS

Programming	Python, SQL (Window Functions, Joins, Aggregations), C, Java
ML / Deep Learning	Machine Learning, Deep Learning, CNN, Transformers, Bayesian ML, Federated Learning, NLP, RAG
Data Engineering	ETL/ELT, Data Pipelines, Data Preprocessing, Data Modeling, FAISS, Feature Engineering
MLOps & Deployment	Model Evaluation, Real-time Inference, Versioning, Gradio, Plotly Dash, SHAP
Frameworks & Tools	PyTorch, OpenCV, Hugging Face, Google Earth Engine, Matplotlib, Seaborn
Core CS	Data Structures & Algorithms, DBMS, OOPS, Computer Networks

PUBLICATIONS & RESEARCH

- **Hybrid Networks for Traffic Flow Detection and Road Accident Severity Analysis** — IEEE · Accepted 2026
- **Distributed Training of Neural Networks in Smart Manufacturing — Book Chapter in Distributed Deep Learning & XAI in Industry 4.0** — Springer, 2025
- **BERT–BART Fusion Model for Abstractive Text Summarization** — IEEE, 2025
- **SnapGesture: CNN-Powered Real-Time Hand Gesture Recognition** — IEEE, 2024

Patent-Pending: 2 projects under active patent application (AI-driven predictive systems & hallucination detection)

KEY PROJECTS

FedDT-PdM: Federated Learning Digital Twin for Predictive Maintenance **Patent Pending**
Python · Bayesian CNN-BiLSTM · SHAP · Plotly Dash · Federated Learning · SQL
- Architected privacy-preserving FL system with Digital Twin simulation for real-time industrial equipment failure prediction
- Built Bayesian CNN-BiLSTM model with uncertainty quantification + SHAP explainability dashboard via Plotly Dash; published IEEE-format paper
- Optimised Python/SQL data pipelines achieving ~20–25% operational efficiency improvement

Confidence-Aware Deep Learning via Monte Carlo Dropout (CIFAR-10) **IEEE Access (submitted)**
Python · PyTorch · Monte Carlo Dropout · CIFAR-10
- Designed uncertainty quantification framework using MC Dropout for calibrated, interpretable confidence scores on CIFAR-10
- Delivered full Colab notebook with reproducible experiments and IEEE-format academic paper

Hallucination Detection & Reduction using RAG **Patent Pending**
Python · Phi-2 · FAISS · DeBERTa NLI · HaluEval · Transformers
- Built lightweight RAG pipeline (Phi-2 + FAISS + DeBERTa cross-encoder) with AND/OR-gate detection logic; 4-bit quantized for GPU efficiency
- Achieved ~25–30% improvement in LLM response reliability validated on HaluEval benchmarks

SnapGesture: Real-Time Hand Gesture Recognition **IEEE 2024**
Python · CNN (9-layer) · OpenCV · Computer Vision
- Built 9-layer CNN + OpenCV pipeline for live gesture recognition; reduced inference latency ~15–20%; published at IEEE 2024

SAR Satellite Automatic Change Detection **SIH 2024**
Python · Google Earth Engine · Geospatial AI · Computer Vision
- Engineered geospatial AI pipeline for automated anomaly detection in SAR imagery; reduced false detections ~15–20%

LEADERSHIP

Joint Secretary · AI Association, Kongu Engineering College 2024 – 2025
- Coordinated AI/ML academic workshops, events, and student-led initiatives; drove peer engagement and knowledge-sharing programs

Newsletter Head · AI Association, Kongu Engineering College 2023 – 2024
- Led editorial management of the technical newsletter, curating AI/ML content and coordinating with faculty contributors