Arunkumar V

AI and Backend Engineer

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Education

Anna University — Chennai, India

Bachelor of Engineering in Computer Science — *May 2022 – Present*

- CGPA: 9.08/10

Professional Experience

Research Assistant — Mar 2025 – Present

National Institute of Technology, Tiruchirappalli — *Tiruchirappalli, India*

- Built nnUNet v2 and Swin-UNETR pipelines for liver and tumor segmentation; improved Dice by 7% on LITS& ATLAS datasets.
- Standardized 2 TB of MRI/CT scans using HU mapping and intensity normalization for cross-scanner consistency.
- Developed pseudo-labeling and test-time augmentation workflows, reducing annotation requirements by 40%.
- Deployed nightly retraining and inference via Vertex AI (Cloud Functions + BigQuery) for scalable experimentation.

AI Engineer Internship — Oct 2024 – Feb 2025

Ionic Protocol — *Remote*

- Built a LangGraph-based multi-agent system for DeFi query actions, reducing latency by 30% and increasing throughput by 25%.
- Implemented a RAG pipeline with LangChain and FastAPI, handling 500 queries/min with a 40% reduction in response time.
- Implemented sparse retrieval, caching, and reranking logic, cutting time-to-first-token by 4x.
- Optimized inference infrastructure on GCP Cloud Functions with autoscaling, reducing compute costs by 20%.

Research Fellowship — Apr 2024 – Sep 2024

Centre for Sponsored Research, Anna University — *Chennai, India*

- Engineered a GAN-based Intrusion Detection System for IEC-61850 protocols achieving 95% accuracy.
- Reduced false positives by 30% using SHAP explainability techniques for threat analysis.
- Launched a real-time monitoring system using Flask, React, and PostgreSQL for cybersecurity applications.
- Secured €15,000 research grant through comprehensive technical proposal and proof-of-concept demonstration.

Research Internship — Dec 2023 – Mar 2024

Indian Institute of Technology — *Indore, India*

- Enhanced Attention U-Net, achieving a 75% Dice coefficient for pancreatic tumor segmentation.
- Implemented Grad-CAM, enhancing clinician diagnostic confidence in 80% of test cases.
- Applied HU units Mapping on Tumor and pancreas for better segmentation on the Medical Decathlon Dataset.
- Co-authored a research paper on medical image analysis findings, ranking in the top 1% of competition submissions.

Key Projects

Fuzzy Name Matching with RAG Search System for Madhya Pradesh Police | *RAG, FastAPI, Phonetic Algorithms*

- Devised a hybrid RAG search system with 98% accuracy on fuzzy-transliterated Hindi names.
- Handled 10,000+ monthly queries via a scalable FastAPI backend connected to structured name records.
- Improved retrieval speed by 30% by combining phonetic, spelling, and context-aware filters.

Time Series Temperature Forecasting Model For Zelestra | *LSTM, CNN, Vertex AI, GCP Pub/Sub*

- Designed and deployed a hybrid LSTM-CNN model on Vertex AI to forecast 24-hour temperatures with 93% accuracy.
- Automated feature selection and model training via Cloud Functions, increasing iteration speed by 25%.
- Enabled scalable real-time inference using GCP Pub/Sub and BigQuery, powering city-wide climate dashboards.

Personalized Financial Assistance AI Agent for Hyperliquid | *LLMs, LangGraph, LangChain, RAG, Google Cloud Run*

- Architected a portfolio-aware AI agent using fine-tuned LLMs and LangGraph to process real-time financial sentiment.
- Employed LangChain for dynamic RAG, integrating P/E, VIX, and earnings data with fast document retrieval.
- Deployed on Google Cloud Run and FastAPI, serving 1,000+ users at ¡500ms latency with 35% simulated ROI.

Technical Skills

Machine Learning & AI: PyTorch, TensorFlow, LangChain, LangGraph, Keras, Local LLMs, RAG, Computer Vision

Development Frameworks: Flask, React, JavaScript, Docker, Linux, PostgreSQL, MongoDB, TypeScript

Deep Learning: CNNs, LSTMs, GANs, Attention Mechanisms, Transfer Learning, Model/Pipeline Optimization

Tools & Technologies: Git, AWS, Azure, GCP, Linux (Arch linux user)

Achievements

- Smart India Hackathon (SIH) 2023 Winner – National Level.
- Smart India Hackathon (SIH) 2024 Runner-Up – National Level.
- 2nd Runner-Up – IHNA Australia Hackathon 2024 – International.
- Runner Up - IIT Roorkee Power System Cybersecurity Hackathon 2024.
- 5th Place - AWS Zelestra Machine Learning Hackathon – International.
- 3rd Place - SBI Life Hackathon – National.

Certifications

- Machine Learning Specialization – Stanford University (Coursera).
- Deep Learning Specialization – DeepLearning.AI (Coursera).
- AWS Certified: Machine Learning – Specialty (MLS-C01) – Amazon Web Services.
- Google Cloud Certified – Generative AI Leader (May 2025).