DHARMESH MOHANRAJ

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Summary

M.S. ECE @ UCSB. I build dependable systems across **DSP**, **wireless**, **embedded**, and **ML/GenAI**. Recent work includes **VIDEX**, an Intelligent video application and **Wireless Optimization Agent** for adaptive network control, with more projects listed below. Certifications include **IBM Agentic AI** and **AWS Cloud Solutions Architect**. Open to roles in DSP, Wireless Communications, Edge-AI, and ML Systems.

Education

- **M.S., Electrical & Computer Engineering** — University of California, Santa Barbara Sep 2024 – Present
  Expected Mar 2026. Relevant Coursework: **Multirate DSP, Signal Compression, Pattern Recognition**
- **B.E., Electronics & Communication Engineering** — Anna University, Chennai Nov 2020 – Jun 2024
  Relevant Coursework: **Digital Communication, Cryptography, Digital Signal Processing, IoT Systems**

Technical Skills

- **Programming & Data:** Python, C, MATLAB, SQL **;** NumPy, Pandas, OpenCV, PyTorch, TensorFlow, scikit-learn
- **Cloud & IoT:** AWS, GCP, The Things Stack (LoRaWAN) **;** MQTT, Modbus, REST APIs
- **GenAI & ML:** LangChain, LangGraph, FAISS/Chroma/Qdrant, Hugging Face, prompt engineering, XGBoost
- **Embedded & Tools:** Arduino, Raspberry Pi, STM32, ESP32 **;** Docker, Git/GitHub, Jupyter, Linux

Work Experience

- **Chakra Network Solutions Pvt. Ltd.** — Summer Intern Jun 2024 – Aug 2024
  - Engineered an IoT telemetry pipeline (**MQTT, Modbus, REST**) for secure, low-latency device communication; standardized payload schemas and retry logic.
  - Analyzed a **7M-row HVAC** dataset (IITM Research Park) to prototype anomaly detection that flagged incipient faults/inefficiencies, reducing unplanned downtime by **∼20–30%**.
  - Built predictive-maintenance workflows that connected IoT data ingestion to trained **supervised ML models**, generating prioritized alerts with threshold-based rankings for operators.
- **Signal Compression Lab, UC Santa Barbara** — Graduate Researcher Jan 2025 – Present
  - Researching **transform-domain TIP (temporal interpolation/prediction)** with **superpixel-guided partitioning** for next-gen video codecs.
  - Prototyped **PyTorch** sub-pixel predictors; evaluating **BD-Rate** against motion-compensated baselines on standard sequences.

Selected Projects (Additional projects and full details: Portfolio)

- **VIDEX: End-to-End Video Intelligence Pipeline** — AWS + Python May 2025 – Jun 2025
  - Built serverless ingest (**API Gateway → Lambda → S3**) with CNN-autoencoder compression achieving **0.95 SSIM**; controlled storage costs via **S3 Glacier Deep Archive**.
  - Automated metadata using **AWS Rekognition** (labels/objects/text); implemented semantic search with **FAISS/Chroma**.
  - Benchmarked vector stores: **FAISS 3.21s index / 0.102s avg query** vs **ChromaDB 7.91s / 0.182s**; **designed migration plan** to **OpenSearch + RAG (LangChain/Bedrock)** for cloud-scale retrieval.
- **AI-Assisted Acoustic Quality Control for Headsets** — DSP + ML Jun 2025 – Jul 2025
  - Designed a **DSP** test pipeline (ESS deconvolution, beamforming, ANC) to measure latency, frequency response, crosstalk, and distortion for stereo headsets.
  - Improved compound-defect detection by **12–15%** using **Gradient Boosting** with conformal calibration; added **SHAP** explanations and abstained on low-certainty cases.
  - Implemented semantic recall of QC reports via **Qdrant** embeddings + indexing, accelerating retrieval versus manual lookups.
- **Lightweight AI Agent for Wireless Network Optimization** — LSTM + LangGraph Jul 2025 – Aug 2025
  - Trained an **LSTM** link-state classifier (approx. **98%** on held-out logs).
  - Deployed a **LangGraph** reflection agent with **Self-RAG + LLM** to adapt actions (modulation/FEC, Tx power, band/beam/relay), improving degraded-link recovery by **20%** in simulation compared to a heuristic baseline.

Certifications

- **AWS Generative AI Applications** — Bedrock, prompt engineering, GenAI solution architecture Jul 2025
- **AWS Cloud Solutions Architect** — VPC/IAM/S3/EC2, scalable architectures, cost optimization Jun 2025
- **Introduction to Network Automation** — APIs, Ansible, NetDevOps, model-driven programmability Jul 2025
- **Embedded Software Engineer (C)** — ARM Cortex, Embedded C, UART/SPI/I^2C Jun 2025
- **IBM GenAI & Agentic AI** — RAG, vector DBs, LangChain/LangGraph Jul 2025