Karthik Thyagarajan

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EDUCATION

Purdue University *August 2024 - May 2027*

B.S. of Computer Science & Artificial Intelligence - 4.0 GPA West Lafayette, Indiana

Relevant Coursework: Data Structures and Algorithms, Computer Architecture, Programming in C, Linear Algebra

SKILLS

- **Languages:** Python, Java, C++, C, JavaScript, TypeScript, SQL, HTML/CSS

- **Frameworks & Libraries:** React, Next.js, Flask, FastAPI, Node.js, NumPy, Pandas

- **Databases & Data Engineering:** PostgreSQL, NoSQL, Firebase, Vector Databases, Pinecone, ETL Pipelines, Data Modeling

- **Cloud & DevOps:** AWS, S3, EC2, Lambda, GCP, Docker, Git, CI/CD, Linux, REST API, Vercel

- **AI/ML:** LLM (LangChain, RAG, CoT/Reasoning, RLHF), Agents, MCP, PyTorch, GAN, RL, Diffusion, Graph Neural Networks

EXPERIENCE

- **Machine Learning Engineering Intern** *Jun 2025 - Present*

  Peraton Labs (Internship & Part-Time Co-op) Silver Spring, MD

  ◦ Developed reinforcement learning agent for IoT malware detection using PyTorch and graph neural networks, reducing exploration latency by 35% and increasing detection coverage by 25% while processing 500K+ device events daily.

  ◦ Built ETL pipelines for heterogeneous graph neural network architecture, extracting and sampling data from SQL databases, performing real-time tensor and matrix calculations, and implementing autoencoders to model device communication patterns, accelerating policy convergence by 40%.

- **Computer Vision Software Engineer** *Feb 2025 - Aug 2025*

  Memories.ai (Part-Time) Remote

  ◦ Architected production video memory framework processing 10K+ video streams for augmented reality applications using Python, Flask, and PostgreSQL, achieving 60% throughput improvement through frame sampling optimization and spatial data indexing.

  ◦ Published Python SDK on PyPI with 2K+ downloads, implementing comprehensive API wrappers, asynchronous processing, and REST API integration for video analysis workflows.

- **Undergraduate Data Engineer** *Aug 2024 - Dec 2024*

  The Data Mine Corporate Partners, Purdue University (Part-Time) West Lafayette, IN

  ◦ Built end-to-end weed detection data pipeline processing 200GB+ drone imagery using Python, TensorFlow, and PostgreSQL, optimizing ETL workflows and indexed queries for 40% faster data retrieval.

  ◦ Engineered semantic segmentation models achieving 92% accuracy on 50K+ labeled images, reducing herbicide usage by 60% and operational costs by $150K annually through U-Net and YOLOv11 architectures.

- **ML Science & Engineering Apprenticeship** *Jun 2023 - Aug 2023*

  Naval Research Laboratory (Full-Time) Washington, D.C.

  ◦ Led 4-engineer team developing deep learning models using UNet, Transformers, and GANs for underwater acoustic modeling, improving transmission loss prediction accuracy by 20% over physics-based simulations.

  ◦ Architected secure Retrieval-Augmented Generation system with LangChain and vector embeddings for classified document retrieval, implementing access controls and reducing query response time by 65%.

PROJECTS

• **Frontera** *Ongoing*

Tools: Next.js, TypeScript, FastAPI, Python, LangChain, Firebase, NoSQL, REST API, Algorithms frontera.app

◦ Founding engineer building full-stack platform serving 500+ users with cofounder matching algorithms, project discovery search engine, community features, and event scheduling; architected microservices backend with FastAPI, Firebase Authentication, NoSQL schema design for social graphs, and WebSocket connections for real-time collaboration.

◦ Engineered multi-agent LLM system using LangChain for automated roadmap generation, task decomposition, and intelligent issue resolution; implemented recommendation engine for user matching and content filtering with collaborative filtering algorithms.

• **Caladrius** *Sep 2025*

Tools: React Native, Python, LangGraph, GPT-4, AWS S3, REST API, Cryptography github.com/karthikcsq/Caladrius

◦ Architected cross-platform AI medical triage application with React Native implementing encrypted QR-based data transfer and zero-knowledge architecture for HIPAA-compliant medical data handling; awarded 2nd Place at HackGT 12.

◦ Built multi-agent diagnostic system with LangGraph processing patient symptoms through specialized agents, achieving 85% triage accuracy and integrating REST API backend with AWS S3 for secure medical record storage.