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, LangChain, PyTorch, TensorFlow, NumPy, Pandas
- **Databases & Data Engineering:** PostgreSQL, NoSQL, Firebase, Vector Databases, Pinecone, ETL Pipelines, Data Modeling, Query Optimization
- **Cloud & DevOps:** AWS, S3, EC2, Lambda, GCP, Docker, Git, CI/CD, Linux, REST API, Vercel
- **AI/ML:** Machine Learning, Deep Learning, Computer Vision, Natural Language Processing, Large Language Models, LLM, RAG, Reinforcement Learning, Neural Networks, Graph Neural Networks, GAN

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 on distributed AWS EC2 infrastructure.
  - Designed heterogeneous graph neural network architecture with autoencoders to model device communication patterns, accelerating policy convergence by 40% and improving anomaly detection accuracy by 18%.

- **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 Robotics Researcher**   *Mar 2025 - Jun 2025*
  IDEAS Lab, Purdue University (Part-Time)   West Lafayette, IN
  - Built real-time SLAM pipeline in C++ and Python integrating sensor fusion and Kalman filtering, improving 3D scene reconstruction accuracy by 25% and reducing mapping latency by 30% through multithreading optimization.
  - Implemented neural radiance fields for novel view synthesis, generating photorealistic scene reconstructions for autonomous navigation and robotic path planning.

- **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 DeepLabv3 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   frontera.app
  - Founding engineer building full-stack AI-powered project management platform serving 500+ users, architecting microservices backend with FastAPI, Firebase Authentication, NoSQL database, and WebSocket connections for real-time collaboration.
  - Engineered multi-agent LLM system using LangChain for automated roadmap generation, task decomposition, and intelligent issue resolution, reducing project planning time by 70%.

- **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 AES-256 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.

- **Personal Portfolio & Blog Platform** *Ongoing*
  Tools: Next.js, TypeScript, React, Tailwind CSS, Pinecone, AWS S3, Python, Vercel github.com/karthikcsq/personalsite
  - Developed full-stack portfolio with Next.js, TypeScript, and AWS S3 CDN integration deployed on Vercel, achieving 95+ Lighthouse performance score and sub-1-second global load times with automated CI/CD pipeline.

  - Implemented RAG-powered semantic search using Pinecone vector database and GPT-4 embeddings, processing 100+ technical blog posts for intelligent content discovery.