Karthik Thyagarajan

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Education

Purdue University *August 2024 - May 2027*
B.S. Computer Science & Artificial Intelligence - 4.0 GPA West Lafayette, Indiana
Relevant Coursework: Data Structures & Algorithms, Systems Programming, Database Systems, Computer Architecture, Linear Algebra

Skills

- **Programming & Frameworks:** Python, Java, C++, C, JavaScript / TypeScript, React, Next.js, Flask, FastAPI
- **Data Engineering & Analysis:** SQL / PostgreSQL, NoSQL (Firebase, MongoDB), Pandas / NumPy, ETL Pipelines, RESTful APIs, Data Modeling
- **Machine Learning & AI:** PyTorch, TensorFlow, LangChain / RAG / Agents, Reinforcement Learning, Graph Neural Networks, Generative AI (Diffusion, GANs)
- **Cloud & DevOps:** AWS (S3, EC2), GCP, Docker, OAuth, Git / GitHub, Linux

Experience

- **Machine Learning Engineering Intern** *Jun 2025 - Present*
  Peraton Labs (Internship & Part-Time Co-op) Silver Spring, MD
  ◦ Integrated heterogeneous graph neural networks with ETL workflows for IoT telemetry ingestion and relationship modeling, reducing data processing time by 35% and improving feature extraction coverage by 25%.
  ◦ Built Retrieval-Augmented Generation (RAG) vector databases for threat intelligence, enabling sub-second embedding search and increasing malware detection accuracy by 30%.
- **Computer Vision Software Engineer** *Feb 2025 - Aug 2025*
  Memories.ai (Part-Time) Remote
  ◦ Architected a scalable backend with REST APIs and asynchronous pipelines for AR-based video processing, improving throughput by 2x and reducing latency by 40%.
  ◦ Developed and published the open-source 'pymavi' Python SDK, enabling seamless API integration and automating video analytics workflows for 50+ developers.
- **Undergraduate Robotics Researcher** *Mar 2025 - Jun 2025*
  IDEAS Lab, Purdue University (Part-Time) West Lafayette, IN
  ◦ Implemented SLAM and view-synthesis pipelines in Python and C++, improving 3D reconstruction accuracy by 25%.
  ◦ Optimized autonomous navigation stack through performance tuning and low-latency mapping enhancements.
- **Undergraduate Data Engineer** *Aug 2024 - Dec 2024*
  The Data Mine Corporate Partners, Purdue University (Part-Time) West Lafayette, IN
  ◦ Designed and deployed a full data pipeline for drone-based weed detection using TensorFlow, Python, and PostgreSQL, enabling 40% faster query performance.
  ◦ Built semantic segmentation models that reduced herbicide use by 60% and improved detection efficiency by 50% versus prior systems.
- **ML Science & Engineering Apprentice** *Jun 2023 - Aug 2023*
  Naval Research Laboratory (Full-Time) Washington, D.C.
  ◦ Led a 4-member team applying UNets, Transformers, and GANs to underwater acoustics, improving prediction accuracy by 20%.
  ◦ Prototyped and deployed a secure RAG (Retrieval-Augmented Generation) system ensuring data confidentiality and operational reliability.

Projects

- **Frontera** *Ongoing*
  Tools: Next.js, TypeScript, FastAPI, LangChain, Firebase, NoSQL https://frontera.app
  ◦ Founding engineer of Frontera, a "Cursor for projects" platform integrating AI-driven planning, roadmap updates, and cofounder/talent matching.
  ◦ Built an AI agent ecosystem using FastAPI and LangChain with Firebase authentication, REST APIs, and real-time React interfaces for intelligent task resolution.
- **Caladrius** *Sep 2025*
  Tools: React Native, Python, LangGraph, GPT-5, AWS S3 https://github.com/karthikcsq/Caladrius
  ◦ Built a cross-platform AI triage assistant using QR-based encrypted medical data sharing, reducing data exposure risks.
  ◦ Designed a multi-agent LLM pipeline for dynamic diagnostic generation, earning 2nd Place at HackGT 12 (Social Impact Track).
- **In The Loop** *Ongoing*
  Tools: Next.js, React, TypeScript, Tailwind, Vercel https://in-the-loop-ai.vercel.app/
  ◦ Developed a web platform to optimize AI-driven chat workflows, improving LLM token efficiency and responsiveness.
  ◦ Integrated streaming LangGraph agents to support contextual continuity and user interrupts in multi-turn dialogue.

- **Verbatim** *Feb 2025*
  Tools: OpenAI APIs, Google Cloud, Next.js, Vercel https://github.com/karthikcsq/verbatim
  - Built a multi-function AI video processing platform with automated summarization, translation, and voice cloning.
  - Deployed at https://www.getverbatim.tech, leveraging Whisper, GPT-4o, and Eleven Labs APIs for high-accuracy multimedia processing.
- **Storytime.ai** *Ongoing*
  Tools: Next.js, React, TypeScript, Tailwind, Vercel https://storytime-sepia.vercel.app/
  - Developed an AI news aggregator clustering similar stories using vector databases and GPT-4o for dynamic summarization.
  - Improved news personalization and reduced information overload through contextual embedding search.
- **Personal Website** *Ongoing*
  Tools: Next.js, React, TypeScript, Tailwind, Vercel, Pinecone, AWS S3, Python https://github.com/karthikcsq/personalsite
  - Deployed personal site on Vercel with AWS S3-backed media hosting, optimized for SEO and global CDN delivery.
  - Integrated a Pinecone-powered semantic search to query Markdown project documentation using embeddings.
- **Photonic Implementation of Quantum Key Distribution** *Oct 2023 – May 2024*
  Tools: Oscilloscope, Python, NumPy https://arxiv.org/abs/2509.04389
  - Built and aligned a photonic QKD prototype using lasers, polarizers, phase modulators, and beamsplitters to implement polarization-based key exchange.
  - Automated data parsing and thresholding (0.004 mW cutoff) for bit-sequence extraction, basis sifting, and noise analysis with Python.
- **Quantum Racer (Educational Android Game)** *Aug 2022 – Dec 2022*
  Tools: Java, Android SDK, Gradle, XML Layouts https://github.com/karthikcsq/QuantumCarGame_Self
  - Designed and implemented an educational Android game translating quantum mechanics concepts (superposition, measurement, decoherence) into racing gameplay.
  - Delivered complete game physics, touch-input UI, and asset pipeline, packaging the final APK for distribution and educational outreach.