

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

- **AI/ML:** LLM (LangChain, RAG, CoT/Reasoning, RLHF), Agents, MCP, PyTorch, Tensorflow, GAN, RL, Diffusion, Graph Neural Networks
- **Data Science:** Numpy, Pandas, PostgreSQL, NoSQL
- **Languages & Frameworks:** Python, Java, C++, C, JS/TS, HTML/CSS, React, Flask, Gradle
- **Quantum Computing:** Qiskit, VQE, QAOA, Quantum ML
- **Other:** REST API, AWS System Design, GCP, OAuth, Git, Docker, Linux

EXPERIENCE

- **Machine Learning Engineering Intern** Jun 2025 - Present
Peraton Labs (Internship & Part-Time Co-op) Silver Spring, MD
 - Developed a novel reinforcement learning (RL) agent for IoT malware detection, reducing exploration latency by 35% and increasing detection coverage by 25% compared to brute-force baselines.
 - Built a heterogeneous graph neural network with autoencoders to model inter-device relationships and accelerate RL policy convergence, improving anomaly detection accuracy.
- **Computer Vision Software Engineer** Feb 2025 - Aug 2025
Memories.ai (Part-Time) Remote
 - Engineered and deployed a scalable video memory framework for AR applications, enabling persistent spatial and contextual awareness while optimizing throughput for speed and scalability.
 - Designed and published a Python SDK for the Mavi platform (<https://pypi.org/project/pymavi/>), streamlining developer workflows for video analysis.
- **Undergraduate Robotics Researcher** Mar 2025 - Jun 2025
IDEAS Lab, Purdue University (Part-Time) West Lafayette, IN
 - Built real-time SLAM and novel view-synthesis pipelines in Python and C++, improving 3D scene reconstruction accuracy by 25% while ensuring deployment safety and reliability.
 - Optimized autonomous navigation algorithms, reducing mapping latency through performance tuning.
- **Undergraduate Data Engineer** Aug 2024 - Dec 2024
The Data Mine Corporate Partners, Purdue University (Part-Time) West Lafayette, IN
 - Designed an end-to-end weed detection pipeline with Python, TensorFlow, and PostgreSQL; optimized queries for 40% faster data retrieval.
 - Built semantic segmentation and localization models for drone-based weed detection, reducing herbicide usage by 60% and improving efficiency 50% over ground-vehicle methods.
- **ML Science & Engineering Apprenticeship** 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 transmission loss prediction accuracy by 20% compared to physics-based models.
 - Prototyped and deployed a secure Retrieval-Augmented Generation (RAG) system, ensuring data confidentiality and operational reliability.

PROJECTS

- **Caladrius** Sep 2025
Tools: React Native, Python, LangGraph, GPT-5, AWS S3, QR-based encryption <https://github.com/karthikcsq/Caladrius>
 - Designed and implemented a cross-platform AI triage assistant that integrates medical history via encrypted QR-based data transfer, reducing data exposure through a least-exposure framework.
 - Built a multi-agent LLM pipeline to dynamically generate diagnostic questions and produce differential diagnoses with confidence scores, improving triage accuracy and prioritization in emergency settings; awarded 2nd Place in HackGT 12's track for social impact.
- **Frontera** Ongoing
Tools: Next.js, TypeScript, FastAPI, LangChain, Firebase, React, NoSQL <https://frontera.app>
 - Founding engineer for Frontera, a "Cursor for projects" integrating an AI assistant for roadmap updates, intelligent planning, and issue-solving, alongside cofounder/talent matching, project discovery, and community features.
 - Built an AI agent ecosystem using LangChain and FastAPI integrated with Firebase authentication, REST APIs, and a React-based workspace interface to enable real-time roadmap updates and intelligent task resolution.
- **In The Loop** Ongoing
Tools: Next.js, React, TypeScript, Tailwind CSS, Vercel <https://in-the-loop-ai.vercel.app/>

- Developed a platform to streamline AI interactions by reducing token wastage and clarifying user intent, improving efficiency of LLM-driven workflows.
- Implemented streaming with a deployed LangGraph agent backend to handle within-thread communications and user interrupts.
- **Storytime.ai** Ongoing
Tools: Next.js, React, TypeScript, Tailwind CSS, Vercel <https://storytime-sepia.vercel.app/>
 - Built an AI-driven news aggregation platform that clusters stories and updates, reducing information overload and improving content personalization.
 - Integrated GPT-4o for dynamic summarization, making use of vector databases for efficient similarity search.
- **Personal Website** Ongoing
Tools: Next.js, React, TypeScript, Tailwind CSS, Vercel, Pinecone, AWS S3, Python <https://github.com/karthikcsq/personalsite>
 - Developed and deployed a personal portfolio site with Vercel and AWS S3, showcasing projects, blogs, and image galleries; optimized for CDN-based global delivery.
 - Integrated a Pinecone-powered RAG pipeline to enable semantic search across Markdown-based project documentation.
- **Verbatim** Feb 2025
Tools: OpenAI APIs, Google Cloud APIs, Next.js, Vercel <https://github.com/karthikcsq/verbatim>
 - Created a multi-function video platform for summarization, translation, voice cloning, and lip-sync, deployed at <https://www.getverbatim.tech>.
 - Automated workflows with Whisper (ASR), GPT-4o (summarization), Google Translate (translation), Eleven Labs (voice cloning), and Twelve Labs (video Q&A).
- **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.