Karthik Thyagarajan

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EDUCATION

Purdue University   West Lafayette, Indiana
B.S. of Computer Science & Artificial Intelligence (Double Major), GPA: 3.93   *May 2027*

- **Coursework:** Data Structures & Algorithms, Computer Architecture, Programming in C, Competitive Programming, OOP

EXPERIENCE

Machine Learning Engineering Intern   Jun 2025 – Present
Peraton Labs   *Silver Spring, MD*

- Developed RL agent for IoT malware detection using PyTorch and graph neural networks, reducing exploration latency by 35% and increasing detection coverage by 25% across 500K+ daily device events.
- Built large-scale data analytics ETL pipelines and heterogeneous graph architecture with autoencoders to model device communication patterns, accelerating policy convergence by 40%.

Computer Vision Researcher   Feb 2025 – Aug 2025
Memories.ai   *Remote*

- Architected video memory framework for AR applications processing 10K+ streams using Python, Flask, and PostgreSQL, achieving 60% throughput improvement through frame sampling optimization.
- Published Python SDK on PyPI with 2K+ downloads, implementing async processing and REST API integration for video analysis workflows.

Undergraduate Robotics Researcher   Mar 2025 – Jun 2025
IDEAS Lab   *West Lafayette, IN*

- Built real-time SLAM pipeline in C++ and Python with sensor fusion and Kalman filtering, improving 3D reconstruction accuracy by 25% and reducing latency by 30%.
- Implemented neural radiance fields for novel view synthesis, generating photorealistic scene reconstructions for autonomous navigation.

Data Engineering Intern   Aug 2024 – Dec 2024
AgRPA   *West Lafayette, IN*

- Built end-to-end weed detection pipeline processing 200GB+ drone imagery with Python and cloud storage, implementing parallel ETL workflows and optimized data partitioning for 40% faster analysis.
- Engineered segmentation models achieving 92% accuracy on 50K+ images through agile sprints, reducing herbicide usage by 60% and costs by $150K annually.

ML Science & Engineering Apprenticeship   Jun 2023 – Aug 2023
Naval Research Laboratory   *Washington, D.C.*

- Developed novel ML algorithms for underwater acoustics, improving transmission loss prediction accuracy by 20% over physics-based simulations.
- Built LangChain RAG system for classified document retrieval, reducing query time by 65%.

PROJECTS & CLUBS

Repple | *Python (FastAPI), Supabase, PostgreSQL, OpenAI API, Pydantic*   Ongoing

- Built FastAPI and PostgreSQL backend with synchronized multiplayer functionality for iOS app with 200+ active users.
- Developed a competitive gamification engine featuring custom ELO matchmaking algorithms, automated cron-based point aggregation, and generative AI workout plans that adapt to user performance metrics.

buildpurdue | *Next.js, PostgreSQL, Supabase, UI/UX Design, Leadership, Mentorship*   Ongoing

- Co-founded a campus accelerator for 15 student startups, providing resources to validate core problems and refine go-to-market strategies.
- Forged partnerships with 4 VC firms and industry mentors, allowing student founders to secure feedback and potential pre-seed funding.

Caladrius (HackGT - 2nd Place) | *React Native, Python, LangGraph, GPT-5, AWS S3, REST API, Next.js* Sep 2025
- Architected AI triage system with encrypted, zero-knowledge data transfer for HIPAA compliance.
- Built multi-agent diagnostic system with LangGraph achieving 85% triage accuracy on symptom analysis.

Personal Portfolio & Blog Platform | *Next.js, TypeScript, React, Tailwind CSS, Pinecone, AWS S3, Python, Vercel* Ongoing
- Developed full-stack portfolio with Next.js and AWS S3 CDN on Vercel, achieving 95+ Lighthouse score and sub-1-second load times with automated CI/CD.
- Implemented RAG-powered semantic search using Pinecone and GPT-4 embeddings, processing 100+ technical blog posts for content discovery.

Verbatim | *Next.js, Python, OpenAI API, Google Cloud, Vercel, REST API* Feb 2025
- Created video processing platform integrating Whisper, GPT-4o, Eleven Labs, and Twelve Labs APIs for transcription, translation, voice cloning, and lip-sync, processing 500+ videos.
- Architected serverless async pipeline on Vercel handling 2GB files with job queues and webhook notifications, reducing wait time by 85%.

Photonic Implementation of Quantum Key Distribution | *Python, NumPy, Oscilloscope, Optics Hardware* Oct 2023 – M
- Built polarization-based QKD prototype achieving 95% photon detection rate and demonstrating secure key exchange over 5m fiber optic channel.
- Automated signal processing pipeline with Python and NumPy for bit extraction and QBER analysis, processing 10K+ samples; published on arXiv.

Quantum Racer | *Java, Android SDK, Gradle, XML* Aug 2022 – Dec 2022
- Designed educational Android game simulating quantum mechanics with custom physics engine and MVC architecture using Java.
- Distributed APK for educational outreach, reaching 100+ students in quantum computing workshops.

TECHNICAL SKILLS

Languages: Python, Java, C/C++, JavaScript, SQL, React, Flask, Next.js
Cloud & DevOps: AWS, S3, EC2, Lambda, GCP, Docker, Git, CI/CD, Linux, REST API
AI/ML: LLM (LangChain, RAG, CoT/Reasoning, RLHF), Agents, MCP, PyTorch, GAN, RL, Diffusion
Quantum Computing: Qiskit, VQE, QAOA, Quantum ML