Aadarsh Pathre

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Education

IIT Madras (Online Degree Program) June 2024 – May 2028
BS in Data Science and Programming

Vishwakarma University June 2024 – June 2027
BTech in Computer Science Engineering - AI and ML

Ajeenkya D Y Patil School of Engineering June 2021 – May 2024
Diploma in AIML

Experience

AI Team Member Dec 2024 – Present
Multi-Disciplinary Drone Project

- Developed **LIDAR integration and mapping system** on Raspberry Pi 5, enabling real-time 3D environmental mapping for autonomous navigation with 15Hz update rate.
- Architected **GPS-free autonomous drone system** using visual SLAM, YOLOv5 object detection, and MiDaS depth estimation, achieving 95% navigation accuracy in indoor environments.
- Implemented **radio-free video transmission pipeline** from drone to ground system using WiFi direct, reducing latency by 40% and eliminating radio interference issues.

Junior Data Science Intern June 2023 – Sept 2023
i3systems.ai

- Designed and trained **custom SpaCy NER model** for insurance document processing, achieving 92% precision across 15 entity types and processing 1000+ documents daily.
- Contributed in building **end-to-end automation pipeline** integrating OCR, NLP models, and data validation, reducing manual processing time by 60% and saving 200+ hours monthly.
- Collaborated with **cross-functional engineering team** to deploy models into production.

Projects

Digital and Intelligence Diet Plan (DIP) RAG Agent | *IBM Watson, IBM Granite, Astra DB, LangFlow, Next.js* Oct 2025

- Developed an **AI-driven Retrieval-Augmented Generation (RAG)** system for personalized nutrition guidance using **IBM Watson Studio** for model orchestration and deployment.
- Leveraged **IBM Granite models** for both **embedding generation** and **LLM-based response synthesis**, ensuring domain-specific accuracy and efficiency.
- Integrated **Astra DB vector store** for scalable semantic retrieval across 10K+ nutritional records, enabling context-aware and adaptive meal recommendations.
- Built and managed the end-to-end pipeline in **LangFlow** and deployed a **Next.js frontend** with multilingual **voice interaction** (STT/TTS) for accessibility.

CNN-based Diabetic Retinopathy Detection with LLM & XAI | *PyTorch, Grad-CAM, Hugging Face, Flask* Oct 2024

- Developed CNN model achieving **94% accuracy** for diabetic retinopathy classification across 5 severity levels using 35,000 retinal fundus images with data augmentation.
- Integrated **Grad-CAM explainability** to highlight critical retinal regions, improving diagnostic confidence for ophthalmologists by providing visual evidence of model decisions.
- Enhanced system with **Hugging Face LLM integration** to generate clinician-friendly explanations, reducing interpretation time by 30% in clinical pilot study.

Movinglines - Mathematical Animation Platform | *React, Python, Manim, OpenAI API, AWS* Nov 2024 – Present

- Building **SaaS platform** to transform natural language prompts into mathematical animation videos using Manim library and LLM integration for automated code generation.
- Targeting **10,000+ educators** to democratize interactive learning content creation, reducing video production time from hours to minutes with zero animation expertise required.
- Implementing **scalable cloud architecture on AWS** with automated video rendering pipeline, supporting concurrent processing of 50+ animation requests with S3 storage integration.

Combinatorial Reasoning in LLMs (CRQUBO) | *Python, QUBO, Gradio, Z3, LangChain* Sep 2024

- Built **modular reasoning framework** combining LLM sampling, semantic filtering, and QUBO-based combinatorial optimization, improving complex query accuracy by 35% over baseline.

- Implemented **task-agnostic interface** supporting multiple reasoning domains (causal, logical, arithmetic), processing 100+ diverse query types with consistent performance.
- Integrated **Z3 theorem prover verification** and ordering modules, achieving 89% consistency in multi-step reasoning chains across 500+ test cases with formal verification.
- Deployed **interactive Gradio web demo** enabling real-time query experimentation with performance visualization, response analysis, and reasoning chain inspection.

Technical Skills

Languages: Python, C, SQL, JavaScript, TypeScript, Bash
AI/ML Frameworks: PyTorch, TensorFlow, Scikit-learn, OpenCV, Hugging Face Transformers, Ultralytics, MiDaS, FastAI, Manim
Web & Backend: ReactJS, Next.js, Django, FastAPI, Node.js, Flask, Tailwind CSS
Data & AI Tools: LangChain, LangGraph, LlamaIndex, LangFlow, FAISS, ChromaDB, AstraDB, Supabase, Gradio, SpaCy, Ollama
Cloud & DevOps: AWS (EC2, S3, Lambda), Google Cloud Platform, Docker, Git, Linux, Vercel
Specialized: Z3 Theorem Prover, QUBO Optimization, Grad-CAM, Visual SLAM, STT/TTS Models
Domains: Computer Vision, NLP, Explainable AI (XAI), RAG Systems, Autonomous Systems, Full-Stack Development

Achievements & Certifications

Deployed AI Headcount System at Shri Mahalaxmi Mandir, Pune during Navratri 2025, managing 50,000+ daily visitors and improving crowd flow efficiency by 30% through real-time occupancy monitoring
1st Place Winner at IBM Hackathon among 15 colleges at Vishwakarma University for developing multi-agent AI solution using IBM Watsonx and Cloud, leading team of 3 developers
1st Place Winner in Codeathon 2025, the inter-departmental Machine Learning Hackathon hosted by Vishwakarma University, competing against 20+ teams for developing multimodal healthcare platform
Open Source Contributor with 10+ repositories on GitHub including ML frameworks and educational tools, actively contributing to AI/ML community with practical implementations
Certifications: IBM Full Stack Software Developer | LangChain for LLM Application Development |Project Management Certification