

ANOOP SENTHIL

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Summary

AI/ML Engineer with an MSc in Artificial Intelligence and hands-on experience across LLM engineering, machine learning, computer vision, and AI systems. Experienced in designing, training, and evaluating intelligent systems, with expertise spanning LLMs, RAG, multimodal models, model fine-tuning, and scalable software development. Interested in building reliable AI systems that translate advanced ML research into practical, production-ready applications.

Education

Master of Science, Artificial Intelligence

Queen Mary University of London

Sep 2025 - Sep 2026

London, United Kingdom

- **Achievements:** Recipient of the Global Talent Scholarship (£5,000) for academic excellence
- **Coursework:** Machine Learning, Neural Networks, NLP, Information Retrieval, AI Ethics

Bachelor of Technology, Computer Science and Engineering

Vellore Institute of Technology

Jul 2021 - Jul 2025

Vellore, India

- **Coursework:** Data Structures & Algorithms, Database Management, Cloud Computing, Software Engineering

Projects

Hybrid RAG System for Scientific Question Answering | [GitHub](#)

Aug 2026 - Sep 2026

- Built a hybrid retrieval-augmented generation pipeline over the SciFact corpus, combining sparse BM25 first-stage retrieval with ColBERT-style late-interaction re-ranking to supply grounded, citation-backed answers from a 4-bit quantized Qwen2.5-3B large language model.
- Implemented a two-stage pipeline where BM25 surfaces top-100 candidates for ColBERT MaxSim re-ranking before the top-5 passages go to Qwen for cited generation, with the ColBERT projection layer fine-tuned via InfoNCE on BM25-mined hard negatives to sharpen domain-specific relevance ranking.
- Evaluated hybrid retrieval on 300 test queries, achieving 0.6858 nDCG@10, 0.6479 AP@10, and 0.6581 RR@10, with a re-ranking latency of 43.1ms/query.

Autonomous Equity Research & Valuation Agent | [GitHub](#)

Apr 2026 - May 2026

- Built a multi-agent system that replicates an equity research associate's workflow, autonomously generating professional PDF investment reports for any publicly traded stock or cryptocurrency from natural language input.
- Designed a 5-agent CrewAI pipeline covering ticker resolution, financial data retrieval, news sentiment classification, and a 10-year DCF model with WACC-based discounting to derive intrinsic value and a final recommendation.
- Integrated Qdrant for retrieval over SEC 10-K filings, ReportLab for PDF generation, and Llama 3.3 70B on Groq for inference, containerized in Docker.

Evolutionary-Augmented Image-Text Retrieval System | [GitHub](#)

Oct 2025 - Jan 2026

- Designed a lightweight multimodal search system retrieving semantically relevant text labels for any input image, enabling accurate visual search without large pre-trained foundation models or expensive retraining.
- Constructed a custom Skip-Gram language backbone trained on a Visual Genome knowledge graph, expanded via a $(1+\lambda)$ evolutionary algorithm to integrate CIFAR-100 labels while preserving the Skip-Gram's semantic structure.
- Aligned MobileNetV3 image features to the enriched text space using InfoNCE contrastive loss, achieving 91% Recall@10 on image-to-text retrieval with strong generalization across related categories.

Preprints

ReVA: A Region-Aware Visual Assistant for Visually Grounded Question Answering | [arXiv](#) | [GitHub](#)

- Developed ReVA to reduce object hallucination in visual question answering by explicitly grounding language generation in both global scene context and localized visual evidence, coupling CLIP ViT-L/14 Vision Transformer (ViT) with Qwen2.5-7B-Instruct LLM through separate whole-image and regional projection bridges.
- To provide the LLM with object-specific evidence for questions requiring fine-grained visual understanding, used RAM++ to identify question-agnostic objects present in the image and spaCy to extract question-dependent objects referenced by the question, Grounding DINO then localized these objects with bounding boxes, enabling RoI Align to extract their visual features from intermediate ViT representations.
- To integrate information across visual abstraction levels without discarding either low-level detail or high-level semantics, used cross-depth self-attention and multi-token pooling, followed by joint captioning and InfoNCE training and LoRA fine-tuning of the LLM to align visual representations with language.
- Evaluated ReVA on VQAv2, MMBench, POPE, and SEED-Bench benchmarks, achieving 73.79% VQAv2 accuracy and 82.85% mean F1 on POPE, while improving MMBench localization by 8.65 points and attribute comparison by 6.82 points.

Experience

DRDO, Ministry of Defence, Govt. of India

AI Research and Development Intern

Jan 2025 - May 2025

Bangalore, India

- Developed an image-to-code automation system using Computer Vision and Deep Learning to interpret control-law diagram images and automatically generate C code, eliminating manual coding for complex diagram inputs.
- Fine-tuned YOLO and OpenCV-based line detection to extract precise bounding boxes and line coordinates from noisy engineering diagrams, constructing accurate logical graphs for automated code generation within 10 seconds.
- Built a pipeline that processed images, translated them into graph representations, performed graph reasoning, and ran GCC syntax checks, which verified the correctness of the generated C code before deployment

Pivotrics

Software Developer Intern

Aug 2023 - Nov 2023

Bangalore, India

- Developed scalable RESTful APIs for a SaaS payment platform using Spring Boot, WebFlux, and PostgreSQL, with non-blocking async APIs and back-pressure management for data stream processing.
- Secured product and customer data by implementing JWT-based authentication and role-based access control using Spring Security.

Skills

- **Languages:** Python, Java, C, HTML/CSS, JavaScript, SQL
- **Frameworks & Libraries:** PyTorch, HuggingFace, LangChain, LangGraph, CrewAI, BMAD Method, OpenCV, spaCy, Spring Boot
- **Developer Tools:** Cursor, Claude Code, Git, GitHub, Jupyter, Docker
- **Databases & Cloud:** PostgreSQL, Qdrant, Amazon Web Services