SHUBHAM AGGARWAL | IIT Madras

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EDUCATION AND SCHOLASTIC ACHIEVEMENTS

Program	Institute	% / CGPA	YEAR
BTech in Mechanical Engineering	Indian Institute of Technology, Madras	8.12/10	2025
XII (CBSE)	J.K.G International School	90.4%	2021
X (CBSE)	J.K.G International School	88.0%	2019

- Achieved an All India Rank (AIR) of **2376** in the highly competitive JEE Advanced examination among **1.4 lakh** fellow candidates
- Achieved **99.57** Percentile in the JEE Mains examination among more than **6.6 lakh** fellow candidates

PROFESSIONAL PROJECTS

Runverve AI-Twins
(Internship)
Dec '24-May'25

To develop an AI-powered personalized running coach to help users achieve their fitness goals

- Designed and deployed an AI-driven Running Coach on **GCP**, orchestrating multiple AI agents using **LangChains** with **RAG**[1], and memory-based personalization for context-aware fitness, healthcare, and motivational guidance.
- Enhanced inference efficiency through **Speculative Decoding** and **Semantic Routing**, reducing latency while preserving model accuracy and alignment with user goals.
- Built a scalable **multi-LoRA** matrix inference framework with reinforcement learning fine-tuning (**GRPO**[2]), enabling dynamic response adaptation to user queries while minimizing computational overhead.

Early Detection of Diabetic Retinopathy
(Meril Life)
Jun '25-Present

To develop an efficient AI pipeline for early classification of diabetic retinopathy severity to prevent vision loss.

- Built a custom **UNet** architecture with residual layers to accurately mask and remove retinal image artifacts prior to analysis, significantly lowering false positive rates, and validated feature localization using **Grad-CAM**
- Fine-tuned the **Qwen2.5-VL** vision–language model using **LoRA** on a multimodal dataset of retinal images and clinical observation text, enhancing severity classification performance across multiple DR stages.

Sports Performance Analysis
(Internship)
Feb '24-Present

Guide: *Prof. Babji Srinivasan, Indian Institute of Technology Madras, India*

- Developed a ball tracking algorithm using **OpenCV** to monitor ball trajectory based on color, circularity, and area properties, and detected ball speed, bounce point, and bat-hitting point with an accuracy of **80%** using a mobile camera
- Employed **mediapipe** library**,** frame differentiation, and background segmentation techniques to track players and bowler speed, and analyzed their motion patterns to understand their strengths and weaknesses
- Presented the prototype at the IIT Madras Conclave 2024 in Delhi and showcased it to the **RCB Cricket team coach**

SubNetworks in Neural Networks
(Research Project)
Jul '24-Mar'25

Guide: *Prof. Venkat Venkatasubramanian, University of Southern California, USA*

- Discovered a hidden network within neural networks, representing approximately **30%-35%** of the original model's parameters with an accuracy comparable to the original model, reducing computational costs and energy consumption
- Analysed the weight distributions in **ResNet50** and its subnetwork and identified that the weight distributions follow a **lognormal distribution**, providing insights into the underlying characteristics and behavior of the neural network

Query Documents using RAG[2]
(Personal Project)
June '24-Jul '24

Build and Deploy a **LLM** Question-Answering Model on PDFs or Word docs using **Langchains** and Huggingface Model

- Designed a multi-agent **Graph RAG** workflow using LangChains and **LaMini-T5-738M**, enhancing the ability to navigate and extract meaningful insights from structured and semi-structured data for solving complex problems
- Built a document retrieval system leveraging sentence transformers (**all-MiniLM-l6**) to convert documents into vector embeddings and Facebook's **FAISS** vector store for efficient vector similarity search
- Deployed a user-friendly interface using **Streamlit** to enable local execution of the question-answering model

POSITIONS OF RESPONSIBILITY

XR Designer
XR Innovation Club
Oct'23-Jul'24

- Collaborated with **ICXR**[3] community and assisted students with XR design-related queries and challenges in Blender a
- Led a team of **XR designers** and created 3d models, Environment, VFX, and UI designs for multiple AR and VR projects
- Conducted a workshop on XR design principles and techniques, including hands-on Blender training for beginners

Design & VFX
InterIIT Team
Sept'23-Aug'24

- Achieved **6th Rank** in InterIIT Cultural 6.0's 3D Animation Competition (IIT Kharagpur) with a **600-frame** character animation created using Blender Software and enhanced with Adobe After Effects post-editing
- Participated in 24-Hours Design marathon competitions and secured the **Top 10th** Position among all 23 IITs

COURSEWORK AND SKILLS

Tensorflow 2.0: Deep Learning and Artificial Intelligence+	Quantum Computing and Machine Learning
Data Science: Transformers for Natural Language Processing+	Probability, statistics, and stochastic processes
IBM Data Science Professional+	Series and matrices
Machine Learning Specialization+	Differential Equations

Languages	Python, SQL, HTML	**Software**	Docker, Tableau, Visual Studio, AutoCAD, Blender
Libraries	Ollama, Scikitlearn, LangChains, HuggingFace, Numpy, Pandas, Matplotlib, Seaborn, OpenCV	**Miscellaneous**	Transformers(LLMs), NLP, RAG, LoRA, GRPO, CNN, RNN, A/B Testing, DataScience Pipeline

EXTRA-CURRICULAR ACTIVITIES

Activities and Hobbies

- Created a World restaurant analysis dashboard using Tableau and ranked **Top 10th** Position in Data-Vizz2 competition
- Actively track and stay updated on the latest trends and advancements in the field of Artificial Intelligence (AI)
- Passionate about creating animations and UI designs, with active participation in various related competitions

+ Online Course [1]Retrieval Augmented Generation [2] GRPO: Group Relative Policy Optimization [3]ICXR: InterCollegiate XR Community