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-Present*	To develop an AI-powered personalized running coach to help users achieve their fitness goals • Developed an AI-driven Running Coach leveraging **Retrieval-Augmented Generation** (RAG), semantic routing, and memory-based personalization to provide context-aware fitness, healthcare, and motivational guidance • Optimized inference efficiency by integrating **Speculative Decoding**, reducing response latency while maintaining model accuracy and alignment with user needs • Implemented a LLM framework using a **multi-LoRA** matrix inference system and reinforcement learning fine-tuning **GRPO**[1] to dynamically adjust model responses based on user queries, minimizing computational overhead
AI Privacy Agents (Personal Project) *Jul '24-Present*	Develop an AI Agent to Leverage Large Language Models for Querying Sensitive Data Without Compromising Privacy • Developed a **hybrid LLM agent** to securely handle sensitive patient data by leveraging query masking techniques and classifying it according to the **ICPC-2** system, ensuring privacy while utilizing global LLM capabilities for medical queries • Developed a system for doctors by using explainability techniques like **Chain of Thought** (CoT) and **Grad-CAM** to verify AI-generated results, along with generation of comprehensive medical reports to enhance understanding and trust
Sports Performance Analysis (Professor Project) *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 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-Present*	*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 process
IBM Data Science Professional[+]	Series and matrices
Machine Learning Specialization[+]	Differential Equations

Languages	Python, SQL, HTML	**Software**	Tableau, Excel, PyCharm, AutoCAD, Figma, Blender
Libraries	Ollama, Scikitlearn, LangChains, HuggingFace, Numpy, Pandas, Matplotlib, Seaborn, OpenCV	**Miscellaneous**	Transformers(LLMs), RAG, LoRA, QLoRA, 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] GRPO: Group Relative Policy Optimization   [2] Retrieval Augmented Generation   [3] ICXR: InterCollegiate XR Community