Anish Mulay

Portfolio | Mail | Linkedin | GitHub

Education

Indian Institute of Technology Madras — Chennai, India
Bachelor of Technology, Master of Technology (Dual Degree) — *Nov. 2021 – Jul. 2026*
Major – Data Science and Artificial Intelligence — *CGPA 8.66/10*

Relevant Coursework

Reinforcement Learning | Deep Learning for Imaging | Mathematical Foundations of Data Science | Machine Learning Techniques | Probability Theory | Linear Algebra

Technical Skills

***Languages**: Python, C++ — **ML Utils**: Pytorch, Tensorflow, HuggingFace — **RL Tools**: OpenAI Gym, Mujoco*
***NLP & LLM**: Transformers, RAG, DPO, LoRA, Langchain **Tools & MLops**: Git, Docker, W&B, Pandas, NumPy*

Publications and Patents

Decisive: Guiding User Decisions with Optimal Preference Elicitation from Unstructured Documents
arxiv link
***Anish Mulay**, Akriti Jain, Divyansh Verma, Aishani Pandey, Pritika Ramu, Aparna Garimella*

Patent Applications (Under Review):
Three patent applications filed with Siemens Research
Topics: LLM-based code generation for DSLs, Knowledge graph reasoning for supply chain analysis, Agentic AI systems

Step Climbing Apparatus,
Granted, No. 542650
***Anish Mulay**, Omkar Soni, Shishir Kulkarni, Kirtanya Gade, Vaidehi Bagaria, R Jayaganthan*

Research Experience

Research Intern | **Decision-Making & Preference Elicitation** — *May – Aug 2025*
Adobe Research — Dr. Aparna Garimella and Dr. Koyel Mukherjee — *Bengaluru, India*

- *Developed Decisive, a framework for document-grounded decision-making tailored to user's preferences*
- *Ensured recommendations are justifiable, reliable, and explainable, unlike generic outputs from current LLMs*
- *Proposed a Bayesian inference system that integrates multi-document evidence with active preference elicitation*
- *Developed a probabilistic Dirichlet preference model updated through information-gain based user clarifications*
- *Achieved 70% accuracy (+17.6% over GPT-4o) and 0.957 NDCG@3, improving decision correctness and ranking*
- *Outcomes: Submitted to ACL-ARR (2025); Patent application under review.*

Research Intern | **Code Generation, Knowledge Graphs & Multi-Agent Systems** — *Dec 2024 – May 2025*
Siemens Research — Multiple patents under review — *Bengaluru, India*

Finetuning LLMs for Code Generation in Domain Specific Languages (DSLs)

- *Developed a strategy combining DPO (syntax alignment) with QA-based CoT fine-tuning for data-scarce DSLs*
- *Achieved a 74% compilation and semantic accuracy via LoRA adapter merging of DPO and CoT-trained models*
- *Uncovered QA-based data (from documentations) to be a substitute for labeled code, reaching 68% accuracy*

Supply Chain Disruption and What-if Scenario Analysis using Knowledge Graphs

- *Built a conversational system based on knowledge graphs to flag vulnerabilities, predicting supply chain disruption*
- *Developed a What-If simulator using knowledge graphs to gauge the impact of global events on the supply chain*

Agentic AI for Product Design

- *Built an agentic pipeline for material requirements, scene rendering, & mesh generation, enhancing creativity*
- *Enabled design through natural language prompts, automating the creation by intelligent and flexible agents*

Explainable InverseRL for Multi-Objective Stochastic Domains *July 2025 – Present*

Guide : Prof Balaraman Ravindran —Wadhwani School of Data Science and AI, IIT Madras *Research Project*

- *Developing methods with Ericsson to enhance trust in RL agents for telecom intent management & self-healing*
- *Proposing a novel framework combining hierarchical IRL with post-hoc explainability for black-box RL agents*
- *Extending AIRL with model-based modifications for stochastic environments & Pareto-optimal decomposition*
- *Designing hierarchical explanations by mapping options to features & objective tradeoffs via reward decomposition*
- *Building causal explainability generating human-readable explanations for policy violations and objective trade-off*

Enhancing Knowledge Graph Reasoning using RL *Sept – Nov 2024*

Guide : Prof Balaraman Ravindran, DA7400 — Recent Advances in Reinforcement Learning *Course Project*

- *Developed hierarchical clustering-based action pruning to handle large action spaces in knowledge graph reasoning*
- *Designed two-tiered policy optimization with cluster and intra-cluster action selection using distance based rewards*
- *Achieved 10.6% better MAP score with 24.3% shorter reasoning path lengths compared to baseline DeepPath*
- *Evaluated across 7 link prediction tasks, demonstrating robust performance improvements in composite metrics*
- *Enhanced efficiency, exploration and explainability of the relations in large knowledge graphs like NELL dataset*

Memory-Efficient LLM Pre-training via Low-Rank Gradient Optimization *Feb – May 2024*

Guide : Prof Chandrashekhar L.

- *Reproduced GaLore training with gradient low-rank projection, achieving 65.5% memory reduction on 7B models*
- *Validated feasibility of pre-training 7B parameter models on consumer hardware (RTX 4090, 24GB VRAM)*
- *Validated performance on C4 dataset using LLaMA architecture, matching full-rank training perplexity*

Professional Experience

Data Science Intern *May – July 2024*

Flipped AI — Prof. Lakshminarayan S, New York University

- *Developed NER and SRL-based pipeline extracting resume highlights with 88.73% accuracy across diverse formats*
- *Designed computer vision approach using YOLO to segment multi-column resumes, handling structural variations*
- *Built hierarchically clustered skills ontology identifying job title clusters across multiple job descriptions*
- *Engineered resume-job matching algorithm achieving 80% accuracy through semantic similarity & skill alignment*

Member of Technical Staff Intern *May – Aug 2023*

DevRev Inc. *Bengaluru, India*

- *Built predictive model tracking customer activity, revenue forecasting, and personalized onboarding workflows*
- *Developed automated DocuSign-DevRev synchronization plugin, eliminating manual effort in customer onboarding*
- *Built resilient data integration solution using web-hooks and REST APIs, enabling real-time workflow automation*

Entrepreneurship

FinsTi *Sept 2022 - Aug 2023*

Co-founder

- *Co-founded fintech startup, securing INR 2L pre-seed as 1 of 7 startups pre-incubated at Nirmaan, IIT Madras*
- *Built automated expense tracking platform with custom analytics, addressing financial management challenges*
- *Validated product through alpha/beta testing with 30+ users, garnering VC interest from Campus Fund*

Scholastics Achievements

Secured an All-India Rank of 3484 among 140 thousand students in JEE Advanced 2021

Secured an All-India Rank of 3125 (top 0.3%) among 1.4 million students in JEE Mains 2021

Extra Curricular Activities

Finalist in TrexQuant ML Challenge *Fall 2023*

Developed an ensemble LSTM & XG-Boost Model to predict stock price fluctuations during earning announcements

Entrepreneurship Cell, IIT Madras *Spring 2023*

Responsible for promoting and nurturing entrepreneurship at IIT Madras, by conducting various initiatives

Chetana Charitable Trust *Fall 2022*

Developed haptic educational kit for aiding understanding of geometry and shaped for partially blind children