Tejal Kulkarni
Computer Science & Engineering
Program: M.S (2027)
Mobile No: +1-858-220-9016

Email: tejalk00@gmail.com
Email: tdkulkarni@ucsd.edu
Github: tejalkul
Nationality: USA

Level	Degree	Institution	Year	GPA
Graduate	M.S	University of California San Diego	2027	-
Undergraduate	B.Tech	IIT Hyderabad	2025	3.92/4 (9.44/10)

Technical Skills

Programming C++, C, Python, Java, Bash, Sed, Awk, ROS

Web Development JavaScript, Express, ReactJS, NodeJS, Material UI, fast-api, socket programming

Libraries and Tools NumPy, Matplotlib, PyTorch, Pandas, TensorFlow, SpaCy, OpenCV, NLTK, git, Scipy, scikit-learn, clip, diffusers, OpenGL, mediapipe, make, cmake, cuda, Docker

Research Experience

Source Free Domain Adaptive Object Detection Done Right *(2024-25)*
Instructor | Dr. Vineeth Balasubramanian *IIT Hyderabad*

- Helped mitigate the limitations of current SOTA SFDA object detection methods by designing a **novel loss function**.
- Leveraged **Grounded-SAM (foundation model)**, reducing feature distortions from domain shifts.
- Tested the method against existing SFDA baselines across multiple benchmarks and submitted findings to **ICLR 2026**.

Evaluating Models and Vision Datasets using IRT *(2023-24)*
Instructor | Dr. Vineeth Balasubramanian *IIT Hyderabad*

- Worked towards assessing model calibration and comparing vision dataset complexities by leveraging **Item Response Theory** - a human competency framework.
- Paper published at **ICML 2024 DMLR Workshop**.

Deep Sea Video Classification *(2023)*
Instructor | Dr. Aiman Soliman, Dr. Matthew Krafczyk *University of Illinois Urbana Champaign*

- **REU FoDOMMaT** Fellow at NCSA.
- Used a **CNN-LSTM-based model** to detect the breathing state of sea turtles using a deep sea video dataset.
- Developed modular ML features for the **open-source DRYML** library, focusing on reproducibility, scalability, and deployment-readiness.

Internships

Qualcomm | *Software Engineering Intern | 10 weeks* *(2024)*

- Optimized large-scale build pipelines by implementing and configuring ccache, significantly reducing compilation duration.
- Improved development efficiency and reduced turnaround time for code changes.
- One of the select few interns to receive a Pre-Placement Offer based on outstanding work.

Academic Projects

Reasoning-Guided Diffusion World Model | *Course: Generative AI* *(2025 (Ongoing))*

- Proposed a method combining **diffusion-based** future state **video generation** with **VLM reasoning** for long-horizon planning.
- Future states will improve the action policy of the robot manipulation tasks in simulation environments.

Efficient Few-Shot Style Adaptation for text-to-image generation models | *Course: Computer Vision* *(2025)*

- Implemented **LoRA** and **hybrid Textual Inversion + LoRA** fine-tuning on Stable Diffusion for few-shot text-to-image generation, reducing overfitting and improving stylistic consistency.
- Explored **multimodal adaptation** techniques (DreamBooth, StyleDrop) leveraging **CLIP-based evaluation** (FID, CLIP similarity) for high-quality image–text alignment.
- Built scalable pipelines with **Hugging Face Diffusers** and **OpenCLIP**, incorporating dataset curation and model optimization to streamline multimodal training and evaluation.

AI Research Assistant | *Course: Personal Project* *(2025)*

- Built an AI-driven Research Assistant leveraging **RAG with LangChain** to dynamically retrieve and summarize academic papers, ensuring contextually accurate responses.
- Integrated Chroma for efficient vector storage, OpenAI embeddings, and sentence-transformers for advanced document retrieval, enhancing the assistant's performance and scalability.

Computing Trust Rank | *Course: Fraud Analytics using predictive and social network techniques* *(2025)*

- Implemented a **TrustRank**-based fraud detection algorithm using a custom **Pregel framework**, to identify accounts with high fraud likelihood.

Legal Document Simplification | *Course: Adv. topics in NLP* *(2024)*
- Developed legal text simplification models with **BART/LongT5**, boosting SARI from **35.3 → 45.4** by addressing token-limit constraints.
- Built an **extract-then-simplify pipeline** (SummaRuNNer + LLM fine-tuning) on the MILDSum dataset.
- Explored advanced **LLM techniques (chunking, summarization, rhetorical role embeddings)** to enhance long-document understanding and simplification efficiency.

Expert Recommendation System | *Course: Data Mining* *(2024)*
- Built a **collaborative filtering-based expert recommendation system** using user-tag interactions from a Q&A platform.
- Implemented custom matrix factorization and evaluated RMSE against the Surprise library's SVD model.

Geometry and Figure Plotting DSL | *Course: Compilers-II* *(2023)*
- Developed a programming language to draw geometrical figures efficiently.
- The language allows the user to visualize and compute geometry concepts by defining geometric types like line, circle, point, triangle and easily perform operations such as finding tangents, midpoints, and altitudes through built-in functions.
- Developed the compiler front-end using Bison/Yacc and used OpenGL to generate compilable C++ code.

Composed Image Retrieval | *Course: Deep Learning* *(2024)*
- Surveyed multiple different SOTA methods of Composed Image Retrieval like, **BLIP4CIR+Bi, Pic2Word, SEARLE, Context-I2W, CompoDiff**.
- Presented these papers and suggested improvements.

Sign Language Generation and Detection | *AI and Robotics Club at IITH, Tinkerer's Lab* *(2024)*
- Used a **Conditional GAN** Model from torchgan library to generate sign language images.
- Used the American Sign Language dataset to train a CNN model to recognize sign language.
- Tested this by capturing video using mediapipe and opencv.

Hotel Booking System | *Course: Software Engineering* *(2024)*
- Developed the backend of a hotel booking system website using object-oriented principles.
- Designed a **PostgreSQL-backed** booking system with FastAPI, applying data warehousing principles for scalable data storage, retrieval, and user-facing operations.
- Documented the software requirements, architecture, OOSD, and testing processes in detail.

Stackoverflow Clone | *Course: Database management systems* *(2023)*
- Primarily implemented backend with NodeJS and PostgreSQL, including database cleaning, session handling, and data integration from **Stack Overflow's internet archive**.
- Front end was developed using ReactJS and Material UI.

Distributed KNN Algorithm | *Course: Computer Networks* *(2023)*
- Developed a novel application layer protocol over TCP to establish a distributed network for **parallelizing the KNN algorithm**, enhancing computational efficiency across multiple computers.

Selected Courses Undertaken

Bachelors	Data Structures & Algorithms, Discrete Mathematics, Foundations of Machine Learning, Compilers, Database Management Systems, Computer Networks, Operating Systems, Computer Architecture, Software Engineering, Tensor Techniques and Algorithms, Information Theory, Deep Learning, Convex Optimization, Reinforcement Learning, Cryptology, Computer Vision, Topics in NLP, Data Mining, Fraud Analytics
Masters	Recommendation Systems, Introduction to Robotics, Generative AI

Scholastic Achievements

- **All India Rank of 990** in the IIT-JEE Advanced out of 1,55,000 candidates *(2021)*
- Among the **top 300** students selected for **InMO** the qualifying round for **IMO** in **9th** grade. *(2018)*
- Received Scholarship in the **Mathematics Prodigy Competition** in 8th grade. *(2017)*

Extracurriculars

- **TA** for **Foundations of Machine Learning, Theory of Computation, Intro to Programming** *(2025, 2024)*
- **1st place** in Idea Quest 2024, an **Edge AI hackathon** organized for Qualcomm Interns. *(2024)*
- **Organized and lead a Computer Vision workshop** at the Tinkerer's Lab, mentoring students on foundational concepts and real-world applications. *(2024)*
- Machine Learning Core in the **AI and Robotics Club** (Tinkerer's Lab) *(2024)*
- Represented IIT Hyderabad at the prestigious **Inter-IIT Sports Meet** hosted by IIT Delhi. *(2022)*