Raavi Gupta

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Education

Columbia University — New York, NY
MS in Computer Science (Machine Learning Specialization) — Aug 2024 - (expected) Dec 2025
Courses: Speech Processing, Algorithms, Generative Models for Code

Indian Institute of Technology (IIT) Bombay — Mumbai, IN
*B.Tech. in Electrical Engineering with Minor in AI (GPA : **9.22/10.0**)* — Nov 2020 - May 2024
Courses: Machine Learning, Statistics, Image Processing, Reinforcement Learning, Game Theory, Blockchain
Awards: KVPY Fellowship (top 0.38% in 0.1M), JEE Advanced (top 0.54% in 0.15M) ['20]; INMO Awardee ['19]

Technical Skills

Programming Languages — Python, C/C++, MATLAB, Bash, SQL, HTML, CSS, JavaScript, VHDL, ARM
Technologies/Frameworks — PyTorch, Keras, TensorFlow, NumPy, Pandas, Transformers, Docker, Git, OpenCV

Research and Technical Projects

Hallucination Detection of Large Language Models (in collaboration with Adobe India) — Aug 2023 - Aug 2024
Advisor: Prof. Ganesh Ramakrishnan | Bachelor Thesis — *Computer Science and Engineering, IIT Bombay*

- **Designed** a **novel** algorithm for detecting factual inaccuracies in LLM responses without relying on external databases
- Surpassed the SOTA AUC-ROC by **12%** (among other results) for Mistral-7B answers evaluated on the NQ Open dataset
- Attained **10X** faster hallucination detection per sentence with reduced computational resources compared to SOTA
- First authored a **research paper** | Submitted key findings to a top artificial intelligence conference

Unsupervised Segmentation of Agricultural Crop Fields — Jan 2024 - May 2024
Advisor: Prof. Rajbabu Velmurugan | Bachelor Thesis - II — *Electrical Engineering, IIT Bombay*

- **Automated** normalized difference vegetation index **calculation** of crop patches | Obtained **0.02 MSE** on custom dataset
- Developed a 2-stage pipeline for aligning and **segmenting six-channel images** using the Segment-Anything model

InterIIT Tech Meet 12.0: Tooling up for Success — Nov 2023 - Dec 2023
Problem Statement Lead | DevRev — *IIT Bombay*

- **Spearheaded** a team of **12 members** for creating an LLM-planner customized for DevRev use-case
- Implemented **10+ research papers** for fine-tuning, prompt-engineering, automated data generation among others
- Secured **third position** overall in the competition among **21 IITs** across India with **1000+ participants**

Algorithmic Construction of Lyapunov Functions — Jun 2022 - Aug 2023
Advisor: Prof. Debasish Chatterjee | Research Project — *Systems & Control Engineering, IIT Bombay*

- Devised a novel method to algorithmically construct Lyapunov functions for nonlinear vector fields
- **Outperformed** the **SOTA** `SOSTOOLS` library in handling non-polynomial continuous black-box vector fields
- Conferred with **undergraduate research award** (URA 01) | Awarded to **5/200+** students in class of 2024
- Presented a **research paper** at the 2024 Australian and New Zealand Control Conference to **100+ attendees**

Autonomous Underwater Vehicle (AUV-IITB) — Jan 2021 - Jul 2022
Advisor: Prof. Leena Vachhani | Student Technical Project — *Systems & Control Engineering, IIT Bombay*
A team of 50+ students that develops underwater vehicles for naval tasks and competes annually at RoboSub competition

- Implemented **Simultaneous Localization & Mapping** Algorithm to map vehicle's path sourcing data from 2+ sensors
- Upgraded present electronics architecture to **ARM®-based** for enhanced performance and reliability
- Accomplished 7th place out of 39 teams [Robosub' 22] | Ranked 2nd out of 54 teams in Propulsion Design [Robosub' 21]

Professional Experience

Piramal Capital and Housing Finance Limited | Machine Learning Intern — May 2023 - Jul 2023

- Achieved **20.4%** improvement in transaction categorization accuracy using a 3-stage pipeline equipped with **LLaMA-7B**
- Institutionalized **2500$** in annual cost savings by leveraging fuzzy matching on web-scraped domain information of **0.8M**+ companies | Thus, saved computational resources by deploying 7B model instead of 13B for categorization

FinIQ Consulting | Quantitative Research Intern — Nov 2022 - Dec 2022

- Formulated a numerical pricing model for low-volatility **Target Redemption Forward** structured products
- Executed the **Black-Scholes method** for option pricing through **geometric Monte Carlo** simulations
- Designed a **neural network** based **BackSolve** of derivative pricing to maximize payoff in Fixed Coupon Notes products