SPANDAN ANAOKAR

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EDUCATION

Indian Institute of Technology Bombay   Mumbai, India
Bachelor of Technology in Engineering Physics   *Nov 2021 – May 2025*

- Cumulative GPA: **9.5/10.0** | Department Rank **5**

Dual Minor in Computer Science (CGPA 9.75/10.0) and AI & Data Science (CGPA 10.0/10.0)

Awarded the **Undergraduate Research Award** for excellent research work in Computer Science

RESEARCH INTERESTS

Deep Learning, AI, Natural Language Processing, LLM, Recommendation Systems

PUBLICATIONS AND PRE-PRINTS

1. *Shrey Ganatra*,* **Spandan Anaokar*,** *Pushpak Bhattacharyya.* **"Timing Matters: Enhancing User Experience through Temporal Prediction in Smart Homes ".**[arXiv] (under review in AAAI25)

2. *Shrey Ganatra, Swapnil Bhattacharyya, Harshvivek Ankush Kashid,* **Spandan S. Anaokar,** *Pushpak Bhattacharyya and the National Law School* **"Jago Grahak Jago: Consumer Grievance Redressal through Large Language Models".** [paper] (under review in COLING25)

3. **Spandan Anaokar*,** *Nahush Kolhe*, Prateek Chanda, Ganesh Ramakrishanan* **"Noise Injection in Sequential Models".** [paper]

* Equal contribution as First Authors

RESEARCH EXPERIENCE

Detecting and Mitigating Hallucination in LegalLLM   *July 2024 - Present*
Guide: Prof. Pushpak Bhattacharyya, CSE Department   *IIT Bombay*

- Utilized Retrieval-Augmented Generation (**RAG**) and prompt engineering with **Llama3** to develop a high-precision legal advisory chatbot, outperforming **LoRA** fine-tuned models in collaboration with Meta and National Law School
- Performed an in-depth literature survey on **hallucination** in LLMs and implemented techniques including Iterative RAG, Agentic Frameworks, and Citation-Enhanced Generation to minimize factual inaccuracies

Recommendation System for Smart Homes   *Aug 2023 - April 2024*
Guide: Prof. Pushpak Bhattacharyya, CSE Department   *IIT Bombay*

- Developed a **transformer** and **temporal convolution network**-based architecture for predicting the time of the next action in smart homes, incorporating **RBF** and **Time2Vec** embeddings to capture temporal dynamics
- Reformulated the regression problem as a classification task, achieving a **10%** improvement in accuracy over baseline models, significantly reducing **RMSE** across multiple datasets for smarter home automation

Noise Injection in Sequential Models   *Jan 2024 - May 2024*
Guide: Prof. Ganesh Ramakrishna, CSE Department   *IIT Bombay*

- Researched the impact of noise injection on sequential models like **Transformers** and **LSTMs**, implementing a modified **gradient descent** algorithm to enhance training stability and robustness in NLP tasks
- Achieved faster **convergence** and enhanced **generalization** across tasks, marking a significant advancement for sequential models, including LLMs, by improving accuracy and robustness in diverse NLP applications

Matformer: Optimizing Vision Transformers for Long-Tail Image Classification   *Nov 2024 - Present*
Guide: Prof. Ganesh Ramakrishna, CSE Department   *IIT Bombay*

- Conducting research on the Matformer architecture for **Vision Transformers**, optimizing long-tail image classification and improving Mean Average Precision (**MAP**) through experimentation with multiple architectural variations

Automating Nano-Optical Measurement   *July 2022 - April 2023*
Guide: Prof. Anshuman Kumar, Physics Department   *IIT Bombay*

- Developed a Python-based automation pipeline for **Spatially Resolved** Photoluminescence Spectroscopy, enabling nanostructure analysis by integrating parallel communication between Thorlab spectrometer and Nanomax stage

TECHNICAL SKILLS

Programming Languages: C++, C, Python, Bash, MATLAB
Machine Learning: PyTorch, TensorFlow, LangChain, Keras, OpenCV, Numpy, Pandas, Seaborn
Software: Git, LaTeX, Jupyter, LT Spice, VS Code

PROFESSIONAL AND ENTREPRENEURIAL EXPERIENCE

Microsoft IDC-Hyderabad | Data Science Intern   *May 2024 - Jul 2024*
Worked with the Data Science Team on a local Agentic LLM framework to integrate device and LLMs
- Implemented the **ReAct** framework to develop a system powered by **Phi-3** that autonomously analyzes device logs, detects anomalies, and recommends solutions in real-time, optimized to run locally to ensure data privacy

NeuralThread.AI | CTO & Co-Founder   *August 2023 - Present*
Used GenAI to streamline the creation of marketing catalogs & markups for a $62 billion global industry
- Lead the technical department to work on cutting-edge image generation, segmentation, and modification
- Raised **$62000** in funding from SINE-IIT Bombay with a current valuation of **$3 million** tentative

TECHNICAL PROJECTS

JPEG Image Compression | *Course Project* | *Digital Image Processing*   *Sept 2024 - Nov 2024*
- Developed the JPEG image compression algorithm in Python, utilizing Discrete Cosine Transform (**DCT**) and entropy encoding, and performed comparative analysis with homogeneous diffusion models

VanGoghAI | *Institute Technical Summer Project* | *Institute Technical Council*   *May 2023 - July 2023*
- Implemented a **Neural Style Transfer** system using feature allignment with pre-trained **VGG19**, generating logos and artistic compositions by blending silhouettes and real-life images with diverse artistic styles

NLP and Large Language Models | *Learner's Space* | *Web and Coding Club*   *July 2023 - Sept 2023*
- Developed advanced NLP systems leveraging **transformer** architectures and LLMs for high-precision sentiment analysis, text classification, and chatbot applications, incorporating techniques like **n-grams** and **transformers**

Deep Carlsen | *Seasons of Coding* | *Web and Coding Club*   *May 2023 - July 2023*
- Developed a chess engine inspired by the **Giraffe** research paper, utilizing deep learning to train on 300+ features and integrating Minimax with **Alpha-Beta Pruning** for efficient game tree analysis and optimal move selection

AI Text Generation | *Winter in Data Science* | *Analytics Club*   *Dec 2022 - Feb 2023*
- Utilized **Wavenet** and **Bigram models** for generating names based on a large database in the MakeMore project

TEACHING EXPERIENCE

Teaching Assistant (TA) | IIT Bombay
- **PH112: Quantum Physics** | Nominated to conduct a **2-hour revision session** for **1400+ students**
- **MA108: Differential Equations** | Led weekly problem-solving sessions for **40+ students**
- **CS626: NLP, Speech, and the Web** | Conducted specialized sessions for **graduate students** for project guidance

Mentorship Roles | Maths and Physics Club, Analytics Club
- **Winter in Data Science: RL** | Mentored **12 students** on Reinforcement Learning through a Kung Fu Game Agent
- **Summer of Science: LLMs** | Mentored **6 students** on Large Language Models with hands-on experience
- **Summer of Science: DSA** | Mentored **6 students** in Data Structures and Algorithms and Computer Programming

KEY COURSEWORK

Computer Science: Operating Systems, Computer Programming and Utilization, Logic for Computer Science, Data Structure and Algorithms, Design and Analysis of Algorithms, Introduction to ML, NLP and Speech, Optimization for ML, ML in Remote Sensing, Digital Image Processing, Statistical ML and Data Mining
Mathematics: Calculus I & II, Linear Algebra, Differential Equations I & II, Numerical Analysis, Complex Analysis, Probability and Stochastic Processes, Markov Chains and Queuing Systens
Physics: Data Analysis and Interpretation, Photonics, Classical & Quantum Mechanics, Waves and Oscillation, Non-Linear Dynamics, Theory of Relativity, Condensed Matter Physics, Statistical Physics, Electromagnetic Theory, Methods in Analytical Techniques
Electrical: Introduction to Electronics, Microprocessors, Digital Systems

Scholastic and Extra Curricular Activities

Scholastic Achievements	• Attained the pinnacle of academic excellence by achieving an **CPI** of perfect **10/10** in the 4th semester • Secured **All India Rank 646** in **JEE-Advanced** and secured **99.81% Percentile** in **JEE-Mains** • Secured **AIR 14** in the **Aptitude Test** for selection into the Indian Institute of Scientific Education and Research • Qualified for **Final Selection Camp** for **IJSO** (International Junior Science Olympiad) by being in the **Top 43** • Qualified for **Final Selection Camp** for **IOAA** (International Olympiad of Astronomy and Astrophysics) by being in the **Top 35** across all of India in the **INAO** (Indian National Astronomy Olympiad)
Competitions	• Awarded the **Student of the year** award with rank **3rd** in the entire school by the Times of India NIE • Awarded **Silver Medals** in 6th and 9th grade in the Homi Bhabha Young Scientist Exam, and developed a **60-70 page research project** proposing solutions to real-world **problem statements** • Awarded a **gold medal twice** in Mathematics Prodigy exam held in 5th and 8th all over **Maharashtra**
Sports	• Played and won **3rd place** in inter-school Chess Competition in Mumbai • Awarded the **Best Student in Sports** certificate in School for winning at local chess championships