SRAVAN K SURESH
Electrical Engineering
Indian Institute of Technology Bombay

22B3936
Dual Degree (B.Tech. + M.Tech.)
Gender: Male
DOB: 31/05/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2027	

Pursuing a **dual minor** in **Artificial Intelligence and Data Science** from **CMInDS, IIT Bombay** and in **Computer Science and Engineering** offered by the **Department of Computer Science and Engineering, IIT Bombay**

Scholastic Achievements

- Awarded with **Undergraduate Research Award (URA01)** for significant contributions in **AI for healthcare** ('24)
- Secured a position in **Top 1.8 percentile** out of **0.16 million+** candidates in **JEE Advanced** examination ('22)
- Achieved **99.4** percentile in the **JEE mains** examination among **1.1 million+** candidates across the country ('22)
- **State Topper** in **Indian Olympiad Qualifiers in Physics (IOQP)** stage-1 competing against **21K+** candidates ('22)
- Received **Scholarship** for excellence in State Talent Search Examination **(STSE)** by **SCERT** (Goa) ('22)
- Recipient of **National Talent Search Examination (NTSE) Scholarship** by **NCERT**, Government of India ('20)

Key Projects

Predictive Modelling of Dental Infections using Deep Learning
(Jun '24 - Present)

Koita Centre for Digital Health (KCDH) | *Prof. Kshitij Jadhav, IIT Bombay* — *Research Project*

- Curated a **novel, unique dataset** of **997 Intra-oral Periapical Radiograph (IOPA) images** with semantic annotations
- Innovated a **unique preprocessing pipeline** using **customized threshold values** and **blending ratios** for each and every image, significantly improving the output quality of using **Enhancement mMG** transformation algorithm
- Implemented a Deep Learning model utilizing the **DenseNet121 architecture**, optimized with the **ADAM optimizer** and **Focal loss** function achieving an accuracy of **73%** through **hyperparameter tuning and optimization**
- Utilized **dynamic learning rate scheduling** to improve convergence, addressing challenges like **high variance** in image dimensions, brightness, **small dataset size**, and **class imbalance**. This model is now being prepared for **publication**

Exploring YOLO Architectures for Computer Vision
(Jun '24 - Present)

Medical Deep Learning and Artificial Intelligence Lab (MeDAL) | *Prof. Amit Sethi, IIT Bombay* — *Summer Project*

- Currently deploying each of the YOLO models (**YOLOv1 to YOLOv9**), comparing their performance on **benchmark datasets** to thoroughly understand their strengths, limitations and efficiency across diverse **object detection** tasks
- Fine-tuned models for optimal performance, **adjusting hyperparameters** and leveraging **Transfer Learning** techniques
- Evaluated models using standard metrics like **mAP (mean Average Precision)**, **IOU (Intersection over Union)** and **F1−score**, documenting improvements and innovations introduced in each version for a detailed analysis

Deep Generative Models: An Odyssey to a New Generative Model
(May '24 - July '24)

Season of Code (SoC) | *Web and Coding Club, IIT Bombay*

- Built and trained a **Deep Convolutional Generative Adversarial Network (DCGAN)**, optimized the model layers to achieve **5% accuracy gain**, documented loss curves and generated images for comprehensive and comparative analysis
- Implemented and compared various **VAE architectures**, including **Vanilla**, **Encoder-Decoder networks**, and its **hybrid models**, evaluating each to identify the best-performing structure among all the experimental pipelines
- Implemented **Diffusion Models** and **latent diffusion techniques**, incorporating modifications for **text-to-image generation** and **classifier-free guidance** and used **UNet** with **TimeEmbedding** to enhance the model performance

Machine Learning for Architectural Layout Classification
(Mar '24 - Apr '24)

Advisor: Prof. Vinay Kulkarni | DS203: *Programming for Data Science* — *Course Project*

- Utilized **OpenCV** for feature extraction and implemented **Gaussian Mixture Models (GMM)** and **DBSCAN clustering algorithms** to group building layouts into six distinct families, facilitating standardized design templates
- Conducted complexity analysis using **K-means clustering** to categorize layouts into Low, Medium, and High complexity. Developed a custom similarity prediction algorithm to retrieve relevant past layouts based on input parameters
- **Engineered key features** like area, perimeter, compactness factor with the help of **OpenCV**, used **Principal component analysis** for **feature refinement** and evaluated models with **Silhouette Score** and **Davies-Bouldin Index**

Other Projects

Image Compression using 2D Discrete Wavelet Transform (DWT) (Oct '23-Nov '23)
Wadhwani Electronics Laboratory, IIT Bombay *Self Project*

- Worked in collaboration with a 4-member team to implement Image Compression using 2D DWT with the **Haar wavelet basis function**, employing a filter-bank technique to achieve **enhanced efficiency in image processing**
- Integrated **MATLAB and Python** for **image preprocessing**, and employed **VHDL** for robust hardware implementation

Quantum Information Technologies and Quantum Computing (May '23 - Aug '23)
Summer of Science + Learners' Space | MnP Club, IIT Bombay

- Implemented Quantum algorithms (**Bernstein-Vazirani, Deutsch-Josza, Shor's search, Grover's search**) utilizing the **Aer-simulator** for quantum research, showcasing their promising potential for future quantum advancements
- Engineered a **Quantum circuit** using quantum gates such as **Pauli-X, CNOT, Hadamard, and Toffoli** to compute the **Hamming weight** of a given binary number and effectively incrementing the computational basis state by 1
- Proficient in pivotal quantum concepts, like **Phase kickback**, **Quantum Entanglement** and **Quantum Phase Estimation**

Combinatorial Computing (May '23 - Aug '23)
Summer of Coding | Web and Coding Club, IIT Bombay

- Studied **enumeration** of elementary configurations, **Backtrack Programming** and enumeration by **exhaustive search**, utilizing this knowledge to solve a two-player game of navigating a **weighted directed graph** in **polynomial time**
- Developed a **Sudoku solver** using the **Z3 library** in Python and effectively applying **SAT formulation techniques**

Technical Skills

Languages	C, C++, Python, Bash, SQL, LaTeX, HTML, Embedded C, VHDL, 8051 Assembly
Machine Learning	PyTorch, TensorFlow, Keras, NLTK, Scikit-Learn, OpenCV
Python Libraries	NumPy, Pandas, Matplotlib, Seaborn, SciPy, PySpark, Qiskit
Other Tools/Software	MySQL, Git, Qiskit, MATLAB, Git, GNU Radio, Quartus, Keil IDE, TCAD, SolidWorks

Key Courses Undertaken

CS and AI/ML	Programming for Data Science, Computer Networks, Computer Programming and Utilization, Introduction to Machine Learning*
Mathematics	Basic Linear Algebra, Applied Linear Algebra, Calculus, Differential Equations
Electrical Engineering	Signal Processing-I, Probability and Random Processes, Microprocessors, Nanoelectronics, Analog Circuits, Electronic Devices, Communication Systems*, Electromagnetic Waves*

**To be completed by November '24*

Positions of Responsibility

Department Academic Mentor (DAMP Mentor) (May '24 - Present)
Department of Electrical Engineering and SMP, IIT Bombay

- Mentoring **12** Sophomores on a one-to-one basis and inspiring them for academic and co-curricular endeavours
- Part of a **54** mentor team selected out of **176 applicants** after rigorous SoP, Peer Review and Interview stages
- Member of the **Experiences sub-group**, responsible for compiling experiences related to various career opportunities

Class Representative (Dec '22 - Aug '23)
Elected by a class of 200+ students after multiple successful ground-works *Dual Degree Batch*

- Addressed the issues of **200+** batchmates, catering to their academic, social and extra-curricular needs
- Organised **two campus-wide Crypt-hunts** for the entire batch with thorough **planning and execution**

Extra-Curricular Activities

- Completed the online course **Machine Learning Specialization** on Coursera offered by Stanford University ('24)
- Completed the **Inter-IIT Chess Summer Camp** under the guidance of expert coaches across the country ('24)
- **Orchestrated** the Choir group for Department Convocation of Electrical Engineering, IIT Bombay ('23)
- Qualified for intra-department quarter-finals in **Football Tournament** organized by **EESA** at IIT Bombay ('22)
- Trained in **Carnatic music** for **over 5+ years** and performed at various live platforms and occasions ('19)
- Played in the **Under-7 Open National Chess tournament** and secured an **All-India Rank** of **49** ('12)