Mitali Meratwal | **190070033**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology, Bombay | **Gender: Female**
DOB: 06-04-2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	null
Intermediate	CBSE	Divine Child High School, Surat	2019	96.00%
Matriculation	CBSE	Delhi Public School Surat	2017	10

Pursuing a **minor** in **Computer Science**

Scholastic Achievements

- Secured **All India Rank 116** in *JEE Mains* emerging as **City Topper** and **State Girls' Topper** *(2019)*
- Secured **All India Rank 789** in *JEE Advanced* competing against 225 thousand candidates *(2019)*
- Recipient of **KVPY** fellowship awarded to top **1%** by Dept. of Science and Technology, Govt. of India *(2019)*
- Conferred with **AP grade** (Advance Performer) in **BB101-Biology** granted to **8** out of **578** students *(2020)*

Internships

Action Recognition in Smart Homes *(May'21 - Aug'21)*

Prof. Thomas M. Deserno | Research Internship *TU Braunschweig, Germany*

- Developed video analysis framework for multi-camera, **multi-person activity recognition** in smart homes
- Tested performance of existing work on enhanced **pose estimators** like OpenPose, AlphaPose, LightTrack
- Remodeled LSTM network from joints based **hand-crafted features**, to extracting features from pretrained **CNN** for **spatial dynamics** and multi layer **LSTMs** with **attention** block for **temporal modelling**
- Upgraded person tracking with **YOLOv4+Deepsort** to support re-indentification and handle occlusions
- Expanded dataset to **300GB** and improved accuracy on realistic and simulated fall datasets from **79%** to **99%**

Key Projects

Self Driving Car *(Sept'20 - July'21)*

Autonomous Vehicles, Computer Vision Subsystem | Team SeDriCa, UMIC *IIT Bombay*

SeDriCa is a 22 membered student team working to build India's first self-driving car with level 4 autonomy

- Developed a **Multi-Task Learning** model using uncertainity to weight losses for **object detection** and **road segmentation** on BDD100K dataset by fusing **Scaled-YOLOv4** and **PSPNet** to reduce computation cost
- Designed and tested **cross connected network** from Faster R-CNN and PSPNet with ResNet50 backbone
- Scrutinized **Hierarchical Multi-scale attention**, **EfficientDet**, **D-LinkNet** to replace existing models

Bosch's Traffic Sign Recognition Challenge *(March'21)*

Inter IIT Tech Meet *IIT Guwahati*

*Part of 10 membered team that won **Bronze** out of **23 teams** which participated*

- Obtained scores on simple baseline model and trained **SOTA** classification networks on **GTSRB** dataset
- Generated embeddings of dataset using **t-SNE** and **layer wise visualisations** of the model trained by user
- Implemented **GradCAM++** and **Lime** to enable the user to investigate incorrect predictions and devised automated scripts for explaining **failures of system** based on confusion matrix, loss and accuracy plots

Multi-Modal Image Registration using Unsupervised Deep Learning *(April'21)*

Prof. Suyash Awate | Course Project *IIT Bombay*

- Customised **Voxelmorph** to register **cross subject brain scans** of different modalities (MRI and CT)
- Trained **CycleGAN** network to register CT scans images with their MRI counterparts on the same dataset

Image Super Resolution *(Dec'20)*

Prof. Amit Sethi | Course Project *IIT Bombay*

- Implemented **SRGAN** to estimate high resolution images from low resolution with an aim to recover content
- Formulated a VGG based **content loss** using output features of VGG19 model pretrained on ImageNet

The Tracking and Navigation Challenge *(Aug'20)*

Autumn of Automation | UMIC *IIT Bombay*

- Programmed a bot with **ROS** to solve perfect maze while avoiding obstacles using **wall follower** algorithm
- Exploited **OpenCV** and **Canny edge detection** for procuring letters present on the walls of the room
- Performed letter recognition utilizing **transfer learning** and **fine tuning** achieving best accuracy of **93%**

Fruit Quality Predictor *(May'20-Jul'20)*

Institute Technical Summer Project *IIT Bombay*

- Built a **real time** application for non-invasive **quality assessment** of fruits by leveraging smartphone cameras
- Constructed a custom dataset and employed various **data augmentation** techniques to make the model robust
- Trained custom and SOTA models achieving best accuracy of 99%, 95% and 90% for banana, mango and pear

Other Projects

Temperature Monitor | *Microprocessors Lab* *(March'21)*

- Interfaced **LM35** temperature sensor using **ADC MCP3008** and displayed it on LCD using **embedded C**
- Played alarm while blinking LEDs at certain frequency if average temperature falls or rises outside the range

Arithmetic Unit | *Digital Systems Lab* *(Dec'20)*

- Implemented and tested a 16-bit signed **ALU** comprising of **Kogge Stone** fast adder using **structural VHDL**

Front-End Web Development | *Learner's Space IIT Bombay* *(July'20)*

- Designed and built a responsive personal homepage using **HTML5, CSS** and **JavaScript** in the bootcamp

Cryptography | *Summer of Science, Maths and Physics Club* *(May'20)*

- Compiled a detailed report on the methods and tools used under **Cryptography**, **Elliptic Curve** Cryptograhy, **RSA** algorithm, **Hash function**, **digital signatures** and how general ciphers can be decrypted

Positions of Responsibility

Department Academic Mentor *(July'21 - Present)*

Department Academic Mentorship Program | Dept. of Electrical Engineering *IIT Bombay*

- Selected as mentor from a pool of 86 applicants on grounds of **interviews** and **extensive peer reviews**
- Guiding **4 sophomores** in their academic and co-curricular pursuits by leveraging the resources of the institute
- Collaborating with a team of 35 seniors towards building a support system for the students in the department

Technical Skills

Languages	C/C++, Python, VHDL, MATLAB, Julia
Libraries	PyTorch, Keras, Tensorflow, OpenCV, Numpy/scipy, matplotlib, Seaborn, Pandas
Softwares	Quartus, Keil, Git, LaTeX, AutoCAD, SolidWorks, Audacity
Development	HTML, CSS, JavaScript

Key Courses

Electrical Engineering	Signal Processing, Digital Systems, Digital Systems Lab, Microprocessors, Microprocessors lab, Control Systems, Probability and Random Processes
Computer Science	Data Structures And Algorithms, Medical Image Computing, Foundations of Intelligent and Learning Agents*, Computer Networks*, Computer Programming and Utilization, Programming for Data Science, Convolutional Neural Networks for Visual Recognition by Stanford University
Mathematics	Calculus, Linear Algebra, Differential Equations, Complex Analysis

** courses will be completed in Nov'21*

Extracurricular Activities

- Volunteered for community service under National Service Scheme by recording audio books for visually impaired
- Coordinated the execution of **FInCoF** Freelancers, Interns and Co-founders Platform getting 120+ startups on board and assisted in securing 90+ internships for the students during Covid-19 *(June'20)*
- One among ten students selected for **Science Film Making Workshop** organised by the Vigyan Prasar *Department of Science of Technology*, Govt. of India and *Film society of Surat, Gujarat* *(Oct'2016)*
- Completed a DSLR workshop and served as a member of Delhi Public School Surat Photography Club *(2016)*
- Successfully completed **8 Level Graduate Course** of **IMA** (Intelligent Mental–Arithmetic ABACUS) *(2010)*