Kalash Setu Shah   200100079

Mechanical Engineering   B.Tech.

Indian Institute of Technology Bombay   Gender: Male

DOB: 11/06/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	CBSE	DAV Public School Pune	2020	95.60%
Matriculation	CBSE	DAV Public School Pune	2018	98.20%

Pursuing Minors in **Computer Science and Engineering** with a **9.25/10.0** CPI

Scholastic Achievements

- Achieved **Department Rank 12** out of **195+** students in the Mechanical Engineering program (Present)
- Secured AIR **660** in JEE Main and AIR **744** in JEE Advanced amongst 0.1 million+ candidates (2020)
- Received the KVPY Fellowship with AIR **299** from the Ministry of Science & Technology, India (2019)
- Awarded the **Certificate of Excellence** for being the national topper in Social Science in class X (2018)

Professional & Research Experience

AI accelerated Extended Reality (XR) Production   *Sony Group Corporation*

XR Systems Engineer | Tokyo, Japan   (May'23 - Jul'23)

- Developed a cutting-edge **AI prototype** that enables seamless text & speech input for XR scene editing
- **Auto-generated** a training dataset using the rule of semantics for **Named Entity Recognition**
- Trained **BERT-base-cased** model from scratch and achieved **95% accuracy** in user intent classification
- Conceptualized a **three-stage** optimised **NLP** system for **real-time** graphics modification under **3** seconds

Automatic Feature Generation in Medical X-Rays   *Max Healthcare*

Koita Centre for Digital Health | R&D Project | Guide: Prof. Kshitij Jadhav   (Aug'23 - Present)

- Developing a **deep-learning** pipeline for automated anatomical measurements in a lower limb radiograph
- Analyzed **Vision Transformers** and application of zero-shot semantic segmentation using **SAM** model
- Devised a novel **min-max loss function** for object detection algorithms with hyper-parameter tuning

Geometric Analysis and Modelling of Farm Plot Polygons   *Google Research*

B. Tech Project | Guide: Prof. Milind Sohoni   (Jun'22 - Nov'22)

- Delivered an **8%** improvement in the **IoU** score between Google Farmplots and Government records
- Developed **Polygon-BFS** algorithm to generate ownership boundaries from satellite-detected farmplots
- Employed **K-Means** Clustering to compare seasonal variation among pixel and green-index parameters

Algorithmic Trading in the Global Commodities Market   *Stellar Alpha*

Quantitative Analyst | Research & Development   (Dec'21 - Jan'22)

- Encoded a model in **C#** using a grid of optimised **indicators** and **test strategy** to generate **alphas**
- Organised and resampled the stock data of over **50** global commodities into **60 second-OHLCV** segments
- Successfully performed a **Backtest** and generated a **113.5%** profit on year-long simulation on the principal

Key Technical Projects

High-Performance Ray Tracing | *Prof. Prabhu Ramachandran*   (Apr'23)

- **Optimized** the Python implementation of ray tracing using **vectorized numpy** and **numba** libraries
- Employed **scalene** profiler to **speedup** Python and achieved performance parity of **96%** compared to C++
- Created Mayavi **animations** of a custom world-and-ray orientation, which can be saved to a **1080p movie**

Machine Learning for Covid-19 Data Analysis | *Prof. Amit Sethi*   (Nov'21)

- Performed thorough **exploratory data analysis** and **hypothesis testing** to derive variable correlations
- Compared **four** regression algorithms to predict the **number of deaths** with the best **R2-score** of **0.87**
- Employed **Random Forest Classifier** to predict the possibility of ICU admission with **90.65 %** accuracy

Meta-Heuristic Optimisation for AUV | *Prof. Avinash Bhardwaj* (Mar'23 - Apr'23)

- Derived the optimum values to minimize **AUV drag** using Linear Programming and Genetic Algorithms
- Encoded the Multi-Objective Optimization Problem and compared the Pareto-fronts of NSGA-3 & MOPSO
- Created a **GUI** using VTK to showcase a **3D** view of the AUV, providing an engaging experience for users

Image Processing for Mold Damage Detection | *Prof. Ramesh Singh* (Apr'22)

- Studied **anomaly detection** and reviewed **deep learning** techniques used in recognizing product defects
- Pre-processed raw images by applying **Gaussian Blur** filter and **Laplacian** filter to enhance the subject
- Designed a CNN model containing nine layers of **Conv2D** and **MaxPool** to get an accuracy of **90.04%**

Options Pricing Models | *Self Project* (Jun'22)

- Articulated the **Black-Scholes** model in Python, allowing for the efficient and accurate pricing of options
- Researched about **Options Greeks** and understood the **intrinsic** and **extrinsic** values of Options
- Developed code to **visualize** key **technical indicators** like Moving Averages and Relative Strength Index

Controller Design for Transmission System | *Microprocessors* (Nov'22)

- Designed a **third-order controller** for spring-mass system, satisfying required performance parameters
- Employed **Ziegler-Nichols** method for tuning a PID controller to overcome measurement disturbances

Technical Skills

Programming	C, C++, C# , Python, SQL, HTML, Bash, Linux
Software & Tools	MATLAB, Simulink, Git, QGIS, MS Excel, Docker, LaTeX

Leadership & Mentorship Roles

Manager, Analytics Club | *Undergraduate Academic Council (UGAC)* (May'22 - Apr'23)
Head of a 5-member team, responsible for catering to the interests of 10k+ students in the field of Analytics

- Ideated a **Pan-India** ML Hackathon & pursued a target of INR **0.5 Million** through corporate sponsorship
- Revamped **Learners' Space** & moderated course on **Big Data Handling** with **1k+** student registrations
- Conducted the first **Blockchain** Mania based on Smart Contracts along with an industry-sponsored hackathon

Department Academic Mentor | *DAMP, Mechanical Engineering* (May '22 - Present)

- Part of a **43** member team selected from **140** applicants on the basis of rigorous interviews and peer reviews
- Mentoring **6** sophomores with their academic & co-curricular pursuits, pushing for all-round/personal growth

Teaching Assistantships | IIT Bombay
*Responsible for taking weekly tutorials of **40+** students and assisting in smooth conduction of the courses*

- **CE102** - Engineering Mechanics, Prof. R.S. Jangid (Spring 2022)
- **MA214** - Numerical Analysis, Prof. S. Baskar and Prof. Sivaji Ganesh (Spring 2023)

Key Courses Undertaken

CS & AI	C++ Programming, **Programming for Data Science**, Deep Learning, Advanced Computer Vision Techniques, **Data Structures & Algorithms**, Microprocessors, **High-Performance Computing**, Computer Networks
Mathematics	Linear Algebra, Single & Multi-Variable Calculus, Differential Equations

Extra Curricular Activities

Culturals	• Won 2nd position in Gyrations GC with two choreographies for Hostel-3 **Dance Squad** • Performed house dance and folk dance styles at **AIDS**, InSync's annual flagship event
Sports	• Part of the **winning** team in **Freshiesta Fitness Competition** in the freshman year • Amongst the top 50 runners in Crossy GC for completing the **5K** run under 25 minutes
Misc.	• Hosted Techfest Lecture Series talk with Hon. **Takaaki Kajita**, 2015 Noble Prize Winner • Ideated and hosted Techfest's first-ever **Ed-Conclave** with **10k+** views on **YouTube** • Received **3rd** prize in the **Honeywell SAE** Student Design Challenge held at Pune