Shivprasad Kathane | **180110076**
Metallurgical Engineering and Materials Science | **Dual Degree (Bachelor of Technology)**
Machine Intelligence and Data Science | **Dual Degree (Master of Technology)**
Indian Institute of Technology Bombay | **Gender: Male**
Email: sgkathane182@gmail.com | **DOB: 10/05/2000**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	9.23
Intermediate	CBSE	DPS Vadodara	2018	96.80%
Matriculation	CBSE	DPS Vadodara	2016	10

Pursuing a **Minor** in **Management** from Shailesh J Mehta School of Management, IIT Bombay

Scholastic Achievements

- **Department Rank 2** out of **100+** MEMS UGs before selection to C-MInDS among **20** across UG depts. *(19-21)*
- Bestowed with the **Prof. AK Mallik Award** for academic excellence as a top-performer for over 3 years *(19-21)*
- **98.60**%ile in JEE Advanced (0.2M); **99.94**%ile in JEE Main (1.2M); **100/100** in Informatics Practices (XII) *(2018)*
- **NTSE**: Achieved **State Rank 1** and recipient of **scholarship** by NCERT awarded to **top-1000** Indians *(15-16)*
- Bagged **International Rank 1** in IMO (SOF) and attended INMO Training Camp (for RMO **top-30**) *(15-16)*
- Honoured with a Silver Medal and a Champion's Trophy in Allen Champ for exemplary academic profile *(2015)*
- Received **Certificate of Merit** in the **national** level of Inter-DPS Science and Maths Talent Examination *(2014)*

Professional & Research Experience

Research Assistant | Dual Degree Project / Master's Thesis **C-MInDS, IIT Bombay**
Guide: Prof. Shyamprasad Karagadde (Centre for Machine Intelligence & Data Science IITB) *(May'22-June'23)*
- Developing *Physics-Informed Neural Networks* to model complex systems using optimisation of custom loss functions
- Application: Prediction of defects in metal alloy components via combined data & physical models using 3D images
- Tuned the design of PINN for solving PDEs using bayesian optimisation discovering a relationship with $R^2 = 0.953$
- Drafted a mid-term report of **40+** pages; Delivered presentation to a panel of professors; Received **10/10** grade
- Presented a flash talk in AI track at *ResCon* (UG Research competition) selected from **100+** abstracts across country

AI/ML Project Intern **Godrej & Boyce, Mumbai**
Guide: Mr. Narendra Patwardhan (Asst Vice President, Godrej Aerospace) *(May'22-July'22)*
- Awarded a *Letter of Recommendation* for exemplary performance working in a team of heads of various plants
- Emerged victorious in *Godrej Shark Tank* for conceptualising workflow of an Industry 5.0 & Sustainability project
- Demonstrated a case for weld quality (image) monitoring using VGG transfer learning achieving **82%** test accuracy
- Transformed IoT+NDT data to apply LSTM (**81%** ACC) & STSF (**99%** TNR, **92%** TPR) models for defect prediction
- Created a pipeline packaged in REST API and deployed on a remote web-server to display prediction from data

Machine Learning Research Intern **Coulomb AI, Bangalore**
Guide: Khushboo Shrivastava (Founder & CEO, Coulomb AI) *(July'20-Aug'20)*
- Reviewed literature & documented on Battery Data Intelligence and ML techniques for SOC & SOH estimation
- Processed & visualised data; Performed feature engineering; Built Regression & CNN models based on prior research
- Demonstrated & compared **4** approaches for battery cycle life prediction with suggestions for improving them

Technology Scouting Intern **AIRBUS, Bangalore**
Guide: Mr. J. Stuhlberger (Vice President, Airbus Technology Scouting Network, Germany) *(July'20-Aug'20)*
- Analysed research and consolidated data on hydrogen storage materials for aerospace to achieve net-zero goals
- Presented to executives a comparative analysis of technologies with recommendations based on figures of merit

International Exposure

Engineering Summer Education Program | Summer Research Intern **University of Tokyo, Japan**
Guide: Prof. Jun Takahashi (Department of Systems Innovation) *(Jun'21-July'21)*
- Selected among **20** from **140+** universities for internship in a lab group at the School of Engineering, UTokyo
- Predicted the annual production of automobiles, aircrafts and wind turbines till 2050 from historical data
- Estimated the C fiber / CFRP composite demand & waste using domain insights, assumptions & prior reports
- Applied auto-regression, curve-fit & extrapolation, growth rate analysis and presented results to foster R&D

International Linkage Degree Program | Start+ '20 Special Auditing Student **Hiroshima University, Japan**
- Represented IITB at **Exchange** Program for developing innovators transforming advanced technology to social goals
- Attended lectures by renowned researchers, discussed ideas & presented a report as part of a diverse India-Japan team

Key Projects

Vital Extraction Challenge in Healthcare | Inter-IIT Tech Meet 11.0 (Team of 8) *(Jan'23-Feb'23)*
- Won the Gold Medal (1^{st} across IITs) for presenting best AI-based solution to extract vitals from ICU monitor screens
- Developed a pipeline for segmentation, bounding-box detection (99% mAP), OCR & graph digitisation in 1.8s/image

Yield Prediction in Semiconductor Manufacturing | IITB Course Project (Team of 3) *(Feb'23-Apr'23)*
- Classified product quality to determine overall yield from process parameters recorded by sensors using 5 ML models
- Employed PCA for feature reduction & SMOTE to handle class imbalance; Achieved 0.54 MA F1 after model tuning

Multilingual Toxic Comment Classification | IITB Course Project (Team of 4) *(Feb'23-Apr'23)*
- Implemented prompt-based and prompt-less finetuning in k-shot scenario for multilingual toxic comment classification
- Utilised T5 model for prompting and finetuned using XLM-R & mBERT classifers achieving best MA F1 = 0.67

CNN Based Medical Image Segmentation | IITB Course Project (Team of 2) *(Sep'22-Nov'22)*
- Implemented U-Net like architectures to segment & classify tumours on BRATS dataset after reviewing literature
- Designed a custom data generator object for image processing; Experimented with loss functions & image modalities

Credit Card Default Prediction | Individual Project *(May'22)*
- Performed exploratory data analysis & visualisation, preprocessed data, engineered features and employed PCA
- Applied 6 ML models to predict default from client data; Achieved best 82+% test accuracy with tuned SVC model

Rainfall Data Fitting & Forecasting | IITB Course Project (Team of 2) *(Mar'22-Apr'22)*
- Transformed 115 years data into time-series and applied SARIMAX & LSTM forecasting after analysing literature

Terrorism: Data Analysis & Predictive Modelling | IITB Course Project (Team of 2) *(Dec'20-Feb'21)*
- Analysed GTD and applied 5 regression models to predict terrorism from aggregated politico-socio-economic data
- Created an official report and presented at the UG Academic Council's *Virtual Research Symposium by Students*

Tabbing App, Web & Coding Club IITB | *Seasons of Code* Project (Team of 3) *(May'19-July'19)*
- Developed a platform for easier & accurate tabulation of scores in debate tournaments using Django framework
- Automated the creation of team-matchups based on ranking and allocation of rooms & judges for each round

Other Projects / Assignments *(2020-2023)*
- Used Linear, Ridge & Lasso regression to predict energy efficiency of buildings with least MSE=5.53 & best R^2=0.94
- Employed Lasso, SV & RF regression models after processing data to predict cloth items rating with RMSE = 0.44
- Achieved 94.5% accuracy with hyperparameter grid search on MLP classifier to predict gesture from muscle activity
- Designed NN from scratch and varied hyperparameters for multi-label classification on *Restaurant Reviews* data
- Predicted whether a customer completes a purchase using KNN model on users sessions data with 89.9% specificity
- Developed a CNN model for *Traffic Sign Recognition* using OpenCV & TF-Keras achieving 98.32% accuracy
- Created an AI for Q&A by identifying top documents using TF-IDF & extracting the sentence relevant to the query
- Implemented *Boundary-Aware Segmentation* network with custom loss function for image segmentation challenge
- Applied Encoder-Decoder & FFNN-BP architectures to generate Part of Speech Tags achieving best F1 = 0.9832

Courses & Skills

Calculus, Linear Algebra, Differential Equations, Numerical Analysis, Computer Programming & Utilization, Python & OOP Concepts (10xIIT), Data Structures & Algorithms (10xIIT), Computation Lab, Problem Solving using Computational Thinking (Coursera), Data Analysis & Interpretation, Intro to AI with Python (CS50 Harvard University), Programming for Data Science, Machine Learning, Mathematical Optimization Techniques, Deep Learning: Theory & Practice, DL for Natural Language Processing, Robotics, Computational Process Modelling, Materials Informatics
Softwares: MS Office, Matlab, Scilab, Jupyter, Google Colab, VS Code, R Studio, PyCharm, Octave, Netbeans, MySQL
Libraries: Numpy, Pandas, TensorFlow, SkLearn, Scipy, Keras, PyTorch, Matplotlib, Seaborn, OpenCV, NLTK, BSoup

Positions of Responsibility

Teaching Assistant (May'23-June'23) | *Course: Differential Equations* **Mathematics Department, IITB**
- Conducting problem-solving sessions for a batch of **35+** freshmen; Evaluating answer-scripts & addressing queries

Mentor, Seasons of Code (May'22-July'22) | *CNN Based Stock Market Prediction* **Web & Coding Club IITB**
- Collated weekly resources to guide **10** students on this project based on implementation of a research paper
- Provided model design & improvement strategies; Increased F1 score from **0.55** to **0.7**; Deployed model as web service

Editor & IITB Head (Jan'21-Dec'21) | *Pan-IIT Magazine on research, tech & business* **IIT Tech Ambit**
- Led a panel of **8** editors; Published **3** well-researched articles (**17** from IITB); Undertook recruitment of new members

Events Coordinator (Apr'19-Feb'20) | *Student body promoting Entrepreneurship* **E-Cell IITB**
- Managed a new initiative R&D Conclave in a team of **10** with **10+** sessions having **350+** footfall at E-Summit '20

Extracurriculars

- Mentored **10+** students on *Data Science* topics as a member of Maths & Physics Club and Analytics Club *(21-22)*
- FLY Scholar (CMI): Enhanced Conscientiousness, Innovativeness, Initiative, Perseverance & Problem Solving *(2021)*
- Attended Mathworks workshop: Deep Learning, Internet of Things & Transfer Learning for Object Recognition *(2019)*
- **1st** in NSS Nature Photography Contest *('19)*; **2nd** in Inter-School Sports Quiz (Assoc. of British Scholars) *('14)*
- UCMAS **Gold Medallist** (8 ABACUS levels at **99.16%**) *('10)*; **3rd** in Inter-Hostel Product Management GC *('21)*
- Served as Jr Design Engineer at Team Shunya, Media Organiser at E-Summit, Newsletter Panelist at Insight *(18-19)*
- Volunteering: Devoted **80+** hours towards community service in Sustainable Social Development, NSS IITB *(18-19)*
- Hobbies: Favourite Sport - Cricket, Movie/Book Genre - Action/Thriller/Mystery, Travel & Photography, Music