Mukesh Raj S
Mechanical Engineering
Indian Institute of Technology Bombay

200100100
B.Tech.
Gender: Male
DOB: 27/11/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	CBSE	Suguna PIP School	2020	94.80%
Matriculation	CBSE	Suguna PIP School	2018	93.80%

Pursuing a minor in **Computer Science and Engineering**

Scholastic Achievements

- Secured a position in the **top 2.37 percentile** in the **JEE Advanced** amongst 0.16 million candidates *(2020)*
- Secured a position in the **top 0.21 percentile** in the **JEE Mains** in a group of 0.92 million candidates *(2020)*
- Recipient of the prestigious **KVPY Fellowship** by the **Department of Science and Technology** *(2020)*
- Was granted the opportunity of admission into **IISc, Bangalore**, for securing an **AIR of 780** in KVPY *(2020)*
- Cleared the competitive **National Talent Search Examination Stage-I** conducted by the NCERT *(2017)*

Industry Experiences

Raptee Energy Pvt Ltd - Vehicle Engineering Intern *(Feb '22 - May '22)*

- Tasked with **designing a virtual vehicle model** to reduce dependency on real-time testing of the vehicle
- Developed a **drivetrain model on Simulink** to obtain and examine the forces acting on the tires of the vehicle
- Devised a **testing plan for validation of the model** and to acquire data that might help in further developments
- Improved upon the model to develop a **full vehicle model**, including the effects of battery drain, among others
- Implemented the same to **examine the power usage characteristics** and improve the efficiency of the vehicle
- Utilized various toolboxes on Simulink, including Response Optimizer and Sensitivity Analyser, in revising several parameters to **improve the accuracy of the model** and achieve results closer to the real-time testing data

Technical Experiences

IIT Bombay Racing Team - Design Engineer

First Indian team to win the design event in the 22-year history of the Formula Student event held annually at Silverstone, UK

Design Engineer - *Vehicle Dynamics and Electric Differential* *(Jul '21 - present)*

- Devise a plan of action to systematically **decide on suspension parameters** in order to maximize performance
- Intend to implement **a slip-based torque vectoring algorithm** using electronic differentials and motor controllers
- Start research on the vehicle dynamic behaviour of an **All-Wheel Drive** car and related torque vectoring algorithms

Junior Design Engineer - *Vehicle Dynamics* *(Sep '21 - Jul '21)*

- Selected as a part of the **23-member contingent** to represent the team at the Formula Student UK, 2022
- Authored the **Model Validation Test plan** to be submitted at the FSUK 2022 **Laptime Simulation Event**
- Was actively involved in planning and executing **on-track testing** and assisted in post-testing **data analysis**
- Worked closely on **Steady State-Simulation models** of the vehicle and compared it to real-time testing data
- Developed a model to analyze the forces acting on tires using **Pacejka Magic Tire Formula** in **MATLAB**
- Employed the model to obtain a function of **optimum slip angle** for a given load to maximize the performance
- Constructed **Yaw Moment Diagram** plots and **GG Diagrams** by performing steady-state analysis on MATLAB
- Analyzed it to obtain various crucial data, including the **maximum** generated **yaw moment** of **4072.311 N-m**

Key Projects

The Lasso Game | Computer Programming and Utilization Course Project *(Feb '21)*

Computer Science Department, Guide - Prof. Kameswari Chebrolu

- Programmed a Lasso Game using **SimpleCPP** package in **C++** deploying simple and colourful graphics
- Employed **Git/GitHub** extensively in building the project for **efficient debugging** and troubleshooting
- Utilized the **branching** functionality to test additional game options without making changes to stable code
- Coded a **Bash script** that compiles the game in a single click to make it more accessible and user friendly

Experimental Validation of Kirsch Solution | Student Design Experiment *(Feb '22 - Apr '22)*

Mechanical Engineering Department (Course Project), Guide - Prof. Krishna N. Jonnalagadda

- Devised an experiment plan to **validate Kirsch Solution of stress concentration** near a hole in a large plate
- Procured and processed Aluminium 6063 sheets onto the dimensions and finish required for the planned experiment
- Specimen was elongated using an **UTM** and was closely observed using a **Digital Image Correlation** setup
- Processed the DIC data using **NCorr** and **GOM Correlate** softwares to obtain the stress concentration
- Arrived at a stress concentration value of 3.02, which was **very close to the Kirsch Solution** prediction of 3

Bootcamps and Workshops

Winter in Data Science - Analytics Club, IIT Bombay *(Dec '21)*

- Studied the mathematics behind Data Science including concepts like **P-values**, **Central Limit Theorem**
- Learned **Pandas** for Preprocessing and Data Analysis, **NumPy** for efficient Numerical Data analysis
- Gained insights on plotting using **Matplotlib** and **Seaborn** to perform competent Exploratory Data Analysis
- Explored algorithms like **Ridge Regression**, **Random Forest Classification** and the **XGBoost** library
- Executed algorithms including **Decision Tree** and **Support Vector Regression** on the Boston Housing Data
- Tuned hyperparameters using **GridSearchCV** to attain a regression model with an **NMRSE of 0.091**
- Explored topics of Deep Learning Vision including **CNN**, **Semantic Segmentation** and **Object Detection**

Technical Skills

Software Tools	MATLAB, Simulink, Git, SolidWorks, Ansys, Microsoft Office
Programming Languages	C++, C, Python, Bash, LaTeX, G-Code, HTML, CSS
Packages and Modules	NumPy, Pandas, Scikit-learn, Matplotlib, Seaborn, django

Positions of Responsibility

Academic Secretary - Mechanical Engineering Association, IIT Bombay *(May '22 - present)*

- Responsible for imparting **clarity about academic prospects** like electives and specializations among students
- Compiled **resources for various software**, including MATLAB and MS Excel, for the reference of students

Teaching Assistant - Engineering Mechanics | Prof. Sauvik Banerjee *(Mar '22 - Jul '22)*

- Entrusted with the responsibility of **mentoring 10 students** by providing them with the required assistance
- Made **solutions for tutorial problems** and assisted the students in understanding them in weekly tutorial sessions

Extracurriculars

- Successfully completed one year-long rigorous training under the **National Cadet Corps, IIT Bombay** *(2020-2021)*
- Secured **3rd position** in Jhatka GC, a competition comprising questions on **electronics and robotics** *(Mar '22)*
- Took **Sanskrit** classes for more than two years and was honoured by the **Samskrita Bharati Tamil Nadu Trust** for clearing the **Maalika** examination with excellent performance in the Distinction class *(2014)*
- Underwent **Kung fu** training for two years and reached the level of **Blue II Belt** and won second place in **6th All India Level Kung Fu, Wushu & Karate Open Championship** in the *kata* category *(2012)*
- Practised **Roller Skating** for two years and won second place in District Level Skating Championship *(2012)*