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Education

Indian Institute of Technology Bombay, Mumbai, India (July '16 - Jul '20)
- Bachelor of Technology in Mechanical Engineering with Honours | **CPI: 8.89/10**
- Minor in Computer Science and Engineering
- Awarded **AA** grade in **21** courses for meritorious performance in a span of **8** semesters

Work Experience

Graduate Software Engineer Trainee | Connected Diagnostics (Sept '20 - Present)
Jaguar Land Rover *Bengaluru, India*
- Developed a **Deep Learning** model to perform fault diagnostics on vehicle engines by analyzing the recordings of **in-car microphone**, thus automating the process and significantly **reducing** warranty costs
- Adopted **MLOPs** for deploying the model and provided necessary support for integrating it with an **android app**
- Defined a **system of JSON** files to label the audio data unifying the **labelling** used by models in the ensemble
- Spearheaded the **development** of **Angular**-based front-end of a companywide **web application** used by the employees to book office spaces, view ongoing projects, apply to them, view other's profile, and update their own
- Contributed to the development of company's human capital by **interviewing** and **mentoring** the new recruits

Research Intern | Cyber-Physical Research & Development Department (May '19 - Jul '19)
JFE Steel Corporation *Kawasaki, Tokyo, Japan*
- Developed an **implicit** transient, multi-phase **STAR-CCM+** model to simulate steel refining process in a converter
- Pioneered the **model simplifications** to limit the **convective-courant** number below **1**, resulting in **solutions** with significantly **improved** computational time and accuracy in line with the experimentally observed values
- Researched key **factors** like converter aspect ratio, outlet design parameters, surface tension, rotation rate, threshold angle and their **effects** on **efficiency** and **time** of the process
- Improved converter and outlet design, effecting **60%** reduction in process time & **10%** increment in output efficiency

IITB Mars Rover Team (Dec '17 - Jul '20)
*Part of 30-membered diverse team to participate in **URC**, an international competition organized in Utah, USA*

Leadership	• Co-lead and supervised a team of **30** students in mechanical, electrical and bioscience subdivisions working on the next iteration of a **prototype** Mars **rover**, capable of extra-terrestrial robotics • Secured rank of **31** among 95 participating international teams at **URC 2018, USA** (MDRS, Utah) • Presented the project & explained the attributes to participants in ResTech 2018 and TechConnect
Technical	• Spearheaded the design of an ambitious **4-wheeled dependent suspension system** for the rover to incorporate **control simplicity** in the robust design of **Rocker-Bogie System** • Contrived **Base Rotation Assembly** and optimized design to limit rover's weight under **50 kg** • Developed Universal Robotic Description Format (**URDF**) of the rover to model it in ROS packages • Explored simulation of Rover's **SDF** model on different surfaces created using heightmaps of greyscale images in **Gazebo**, to verify the terrain transversal capabilities and look for possible failures

Key Technical Projects

2-Stage Human Activity Recognition | Undergraduate Thesis (Jul '19 - Jul '20)
Guide: Prof. Asim Tewari *Dept. of Mechanical Engineering, IIT Bombay*
Objective: To achieve Human Activity Recognition in monocular videos using an efficient 2-Stage approach
- Developed an efficient, modular, and versatile **2-Stage approach** for **Human Activity Recognition** which uses human joint localization to estimate **joint angle variations** in time for recognition task
- The model achieved **98.19%** accuracy on **KTH** dataset at a lower computational cost than state-of-the-art methods
- Worked on extending the model for **multiple agents** and explored its applications in **assembly line safety**

Intelligent Shirt Classifier | NCAIR, IIT Bombay (Dec '18 - Feb '19)
Guide: Prof. Asim Tewari *Dept. of Mechanical Engineering, IIT Bombay*
Objective: Create an intelligent system capable of classifying wearables, with a potential of use in the fashion industry
- Developed an end-to-end Convolutional Neural Network from **scratch** in **PyTorch**, to classify shirts worn by people
- Trained it on a **custom dataset** (shirt trials images), pre-processed in **OpenCV** to achieve test accuracy of **82%**
- Explored human image extraction from CCTV using **YOLO**, to be pre-processed and fed to the CNN in real-time

Multiphase Modeling of mould filling in Epoxy Resin casting process (Mar '18 - Jul '18)
Guide: Prof. Abhilash Chandy *Dept. of Mechanical Engineering, IIT Bombay*
Objective: To simulate the process of Resin injection for the casting of an insulation layer on a transformer core

- Involved in the development and meshing of **cast geometries** from raw CAD files of the mould
- Simulated resin flow in **2D** cast geometries on **ANSYS Fluent** using **implicit VOF multiphase criteria**
- Analyzed simulation data to gain useful insights regarding volume fraction and mass flow rate of the resin phase
- Resolved the **divergence issues** and optimized solving time for simulations of flow in **3D** geometries
- The project work was presented in Paper No. 490 of Fluid Mechanics and Fluid Power (FMFP) conference, 2018

Course Projects

Multi-Level Parallelisation of ML algorithms | ME766 (Spring '19)
Course instructor: Prof. S. Gopalakrishnan *Dept. of Mechanical Engineering, IIT Bombay*

- Parallelized the **k-fold cross-validation** and **Hyper-parameter tuning** for ML algorithms on **CUDA**
- Achieved **2.55x and 3.7x speedup** for linear and logistic regression (classification) respectively, compared to the counterpart serial codes in C++, using NVIDIA GEFORCE 940MX GPU

Quaternion-based Model for Human Motion | IE643 (Autumn '19)
Course instructor: Prof. P Balamurugan *Dept. of IEOR, IIT Bombay*

- Addressed the **prediction** and **generation** of **3D human poses** by improving **QuaterNet** (which is a recurrent network that models human motion using Quaternions-based representations of joint angles)
- Adopted a modified architecture inspired by **seq2seq** models to improve **computational efficiency** and reduce training time (by **53.6%**) of QuaterNet, without significant loss in accuracy

Implementation of learning models | ME781 (Autumn '18)
Course instructor: Prof. Vinay Kulkarni *Dept. of Mechanical Engineering, IIT Bombay*

- Performed and evaluated **data imputation** capabilities of **Regression Trees** and **KNNs** using different statistics
- Studied and verified effects of **Bagging, Random Forest** and **Adaboost** on overfitting of the Regression Trees
- Trained a Neural Network (**1** hidden layer) and compared its weights to the one created using **scikit-learn library**

Technical Skills

Programming Languages	C++, Python, Javascript LaTeX, HTML , CSS
Libraries & Tools	Numpy, Pandas, PyTorch, TensorFlow, OpenCV, Angular, Git, Jira
3D CAD & Simulation	ANSYS, Solidworks, STAR-CCM+

Key Credited Courses

These courses were completed as part of the degree at Indian Institute of Technology Bombay

Computer Science	Data Science	Mechanical Engineering
Operating Systems	Advanced Topics in Deep Learning	Machine Design
High Performance Scientific Computing	Deep Learning - Theory and Practice	Heat Transfer
Data Structures and Algorithms	Engineering Data Mining & Applications	Strength of Materials
System Dynamics: Modeling & Simulation	Introduction to Machine Learning	Fluid Mechanics
Logic for Computer Science	Data Analysis and Interpretation	Manufacturing Processes

Certified MOOCs

These are certified non-credited Massive Open Online Courses offered by renowned institutions

1. Natural Language Processing (NLP), *offered by* Microsoft, edX, Verified Certificate
2. Introduction to Git and GitHub, *offered by* Google, Coursera, Verified Certificate
3. Agile Software Development, *offered by* University of Minnesota, Coursera, Verified Certificate

Refrences

1. **Prof. Asim Tewari**, Department of Mechanical Engineering, IIT Bombay, Email: asim.tewari@iitb.ac.in
2. **Prof. Abhilash Chandy**, Department of Mechanical Engineering, IIT Bombay, Email: achandy@iitb.ac.in
3. **Kishore Karnala**, Software Architect, Jaguar Land Rover, Email: kkarana3@jaguarlandrover.com
4. **Shingo Sato**, JFE Steel Corporation, Email: shing-sato@jfe-steel.co.jp
5. **Prof. Balamurugan Palaniappan**, Department of IEOR, IIT Bombay, balamurugan.palaniappan@iitb.ac.in