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Education

Indian Institute of Technology Bombay, Mumbai, India (July '16 - Jul '20)
- Bachelor of Technology in Mechanical Engineering with Honors | **CPI: 8.89/10**
- Minor Degree 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 | Connected Diagnostics (Sept '20 - Present)
Jaguar Land Rover *Bangalore, India*
- Developed a **Deep Learning** model to perform fault diagnostics on vehicle engine by analysing 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 **labellings** used by models in the ensemble
- Spearheaded the **front-end development** 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 **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 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 representation 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 Courses

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

Miscellaneous

- As a Techfest Coordinator, managed a workshop on **NAO-Robots** with **100+** participants and contacted **30+** college ambassadors and self-defense institutes for conducting **NIRBHAYA** initiative (Apr '17 - Dec '17)
- Mentored a team of freshmen, to build a **RC Plane**, by providing technical assistance and moral support (Sept '17)
- Attended a certified **Annual Training Camp** at 2 Maharashtra Engr Regiment NCC, IIT Bombay (Dec '2016)

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