Om Prabhu

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http://omprabhu31.github.io/

All the links appearing below are also available at https://omprabhu31.github.io/cv.

I am a fourth year undergraduate at IIT Bombay, pursuing a dual degree in **Mechanical Engineering** and minor in **Systems & Control Engineering**. My research interests are in the field of **robotics**, especially in **perception for autonomous vehicles** and **NLP for achieving human-like cognition**. I am also interested in **optimization** and **deep learning**. I am currently **looking for a research internship** in these areas.

Education

2019 – 2024 **Indian Institute of Technology Bombay, India** 8.13/10 GPA

2017 – 2019 **Sathaye College of Science, Commerce and Arts** 89.23%

2017 **Ajmera Global School** 95.38%

Work Experience

2022 **Research & Development Intern**
Supervisor: Prajesh Pandey | R&D Engineer, SEDEMAC Mechatronics Pvt Ltd

Completed a project involving an extensive literature review of standard manufacturing guidelines & material selection criteria for fastening joints and their behaviour under eccentric loading conditions, and carried out stress analysis of fastening joints in non-standard part geometries.

Research Projects

2021 **Humor Detection using BERT Sentence Embedding**
Guide: Prof. Balamurugan Palaniappan | Industrial Engineering & Operations Research, IIT Bombay

Read *ColBERT: Using BERT Sentence Embedding for Humor Detection* and analyzed pre-existing models discussed in supporting literature. We initially replicated these models and verified their accuracy before modeling our own version using convolutional layers instead of dense layers.

LU Decomposition: A Timing Study using OpenMP and CUDA
Guide: Prof. Shivasubramanian Gopalakrishnan | Mechanical Engineering, IIT Bombay

Parallelized gaussian elimination, Doolittle algorithm and Crout's method for LU decomposition of a matrix using OpenMP & CUDA, and carried out a timing study by varying the matrix order and number of CPU threads (for the OpenMP implementation).

The following links can be used to access the project report and presentation.

Course Projects

2022 **Shoe-stopper: Step Counting using Piezoelectricity**
Guide: Prof. Ramesh Singh | ME 423: Machine Design

Carried out material selection & stress analysis for designing a piezoelectric shoe. Apart from mechanical knowledge, the project also involved designing the circuit and programming an Arduino for counting steps based on voltage fluctuations from the piezoelectric sensors.

The following links can be used to access the project report and code.

Operations Research in Air Traffic Flow Management Systems
Guide: Prof. Avinash Bhardwaj | ME 308: Industrial Engineering and Operations Research

Carried out a brief literature review on air traffic management systems and analyzed pre-existing models. We then proposed a binary integer program by generating a suitable objective function & formulating the required constraints, and finally implemented the model using AMPL.

The following links can be used to access the project report and presentation.

Course Projects (continued)

2021 **Measuring Seismic Movement Using Accelerometers**
Guide: Prof. Dipanshu Bansal | ME 226: Mechanical Measurements

Studied the working principles of a seismic accelerometer and used its characteristic equation to derive the system output. We also carried out error analysis for step and sinusoidal inputs, and used the resulting equations to calculate the natural frequency and its associated phase error.

The following link can be used to access the project report.

Reading Projects

2022 **Stabilization of Rigid Body Dynamics by Internal and External Torques**
A. M. Bloch, P. S. Krishnaprasad, J. E. Marsden, G. Sánchez de Alvarez

Studied rigid bodies with external torques, energy-momentum algorithms such as the energy-Casimir method, correction of phase shifts and spin stabilization of dual spin satellites.

The presentation for the same can be found here.

2021 **Intrinsic Extended Kalman Filter on Lie Groups**
D. H. S. Maithripala, Ravi N. Banavar

Learnt about discretization of the Kalman Filter on lie groups and its application to rigid body motion. We also implemented the Kalman Filter in Python for estimating the angular velocity of a simple pendulum without explicit differentiation of its angular displacement.

The code for the same can be found here.

Relevant Coursework

Mechanical Machine Design, Optimization, Industrial Engineering & Operations Research, Microprocessors & Automatic Controls, High Performance Scientific Computing

Control Systems Analytical & Geometric Dynamics, Linear & Nonlinear Systems, Signals & Feedback Systems, Mathematical Structures for Control

Other Operations Analysis, Deep Learning: Theory & Practice, Linear Algebra

Teaching and Mentorship

2020-2021 **Undergraduate Teaching Assistant**
ME 119: Engineering Graphics & Drawing | Prof. Neeraj Kumbhakarna

Mentored a batch of 30 students by solving conceptual doubts and conducting weekly lab sessions on AutoCAD, and evaluated answer scripts.

Academic Achievements

2020 Secured a change of branch (**top 11% students**) to Mechanical Engineering due to exemplary academic performance in freshman year.

2019 Achieved All-India Rank **1670** out of 169,000 students in **JEE (Advanced) 2019**. The JEE is an all India standardized test for admission to various highly coveted technical undergraduate programs.

2017 Awarded the **World Topper** certificate for scoring **100%** in Extended Mathematics in the March 2017 session of Cambridge IGCSE examinations.

Technical Skills

Languages LaTeX, Python, R, C#, C++, Sage

Tools MATLAB, ANSYS Fluent, Abaqus, AutoCAD, SOLIDWORKS, AMPL, GitHub