Ankush Arora

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Education

Indian Institute of Technology Delhi — Hauz Khas, New Delhi, India
B.Tech. in Mechanical Engineering — *July 2019 – June 2023*
GPA: 8.55/10.00

Skills

LaTeX, C++, Java, Python, MATLAB, Git, scikit-learn, Pandas, Tensorflow, Scipy, Numpy
Siemens NX (UG NX), Teamcenter, Autodesk Inventor, Solidworks, FluidSIM, VMD, Avogadro,
Ansys Mechanical, Automation Studio, PLC Programming, Microsoft Excel, Microsoft PowerPoint

Areas of Interest

Mechanical Design, Vehicle Dynamics, Steering Systems, Motion Simulation, Suspension hard-points design, Multi-body dynamics, Tyre Modeling, Manufacturing System Design, Game Theory, Stochastic Modeling, Simulation Optimization

Work Experience

Bajaj Auto Limited — Akurdi, Pune, Maharashtra, India
Assistant Manager, Steering Systems, Vehicle Design, Research and Development — *July 2023 – Present, Full-time*

- Theoretically evaluated Kingpin Moment for 4 Wheeler and compared with the Testing Data to analyse steering torque hysteresis loop formation, closing in on testing average within 5.8% range of the estimated effort.
- Coordinated tests for pneumatic trail (Self-Aligning Torque from tyres), caster trail and scrub radius (CMM Inspection) for Kingpin inclination, Understeer Gradient and visualization of actual road wheel steer angle
- Related Kingpin Moment to Steering Wheel Effort having a rack and pinion arrangement, and estimated Steering Wheel Returnability close to the angle achieved till 3 seconds in physically testing the vehicle.
- Compared Roller Chassis Dynamometers of different manufacturers to conclude what provides better road load simulation using Levene's test and t-test on absolute differences in *python* involving data from CAN loggers.
- Attained Geometric Dimensioning and Tolerancing (GD&T) training for practical designing of vehicle parts
- Introduced variety reduction of bolts by 12% on the basis of close class, across flat and application.

Colonist LLC — United States (Remote)
Quality Assurance Tester — *April 2023 – June 2023, Part-time*

- Performed end-to-end testing on colonist.io, an online board game platform with millions of active users, to identify and report software defects, ensuring the smooth functioning of the platform.
- Collaborated with developers and designers to provide feedback on game mechanics, user interface, and quality.

Research Experience

McGill University — Montréal, Québec, Canada
Undergraduate Researcher — *May 2022 – July 2022, Internship*
Guide: Prof. Adam Hendricks, Department of Bioengineering, McGill University

- Ventured Cell Culture and Western Blotting for detecting huntingtin protein concentration for COS-7 lysate.
- Scaled the antibody coupling step by 2.5 to get 1.25 mg coated magnetic beads; optimizing immunoblot analysis.
- Documented the protocol for sample preparation illustrating the precautions focusing 80% confluent P100 of cells.

National Tsing Hua University — Hsinchu, Taiwan (Remote)
Undergraduate Researcher — *June 2021 – July 2021, Part-time*
Guide: Prof. Lee-Wei Yang, Inst. of Bioinformatics and Structural Biology, National Tsing Hua

- Employed the use of Visual Molecular Dynamics to attain energetically stable positions of any protein structure.
- Implemented Kabsch Algoritm lowering RMSD by 7% for superimposition of the new structure.

Awards & Achievements

MITx MicroMasters: Successfully passed (DI) the SCM MicroMasters affiliated to MIT (Massachusetts). [2023-2024]

MITACS GRI: Selected among top 1% for undergraduate research in Canada with 10000+ eligible applicants. [2022]

Teaching Assistant at IIT Delhi: Offered Teaching Assistantship on merit basis for a course of 400+ students. [2022]

Department Change at IIT Delhi: Secured department change among top 9% in a batch of 1000+ students. [2021]

Joint Entrance Examination: Secured All India Rank 67 in JEE Main Paper II. [2019]

Joint Entrance Examination: Secured top 0.2 percentile in JEE Main & Advanced with 1M+ candidates. [2019]

Projects

Discrete Simulation Optimization Package Development |

Guide: Prof. Varun Ramamohan, Department of Mechanical Engineering, IIT Delhi *August 2022 – May 2023*

- Engineered a Python package using simulation-based algorithms for optimizing hyperparameters in machine learning models, significantly enhancing performance across various technical domains.
- Implemented cutting-edge algorithms such as Stochastic Ruler (SR), and Ranking and Selection methods to fine-tune hyperparameters in MLP, SVM, and Random Forest models, showcasing improved accuracy.
- Through rigorous t-tests, showcased superior performance of SR over Hyperopt TPE in breast cancer analysis for Random Forest classifiers, later extending the SR class for broader optimization problems like facility location.
- Automated the Adaptive Hyperbox Algorithm (AHA) local search for general optimization problems; highlighted the algorithm's sensitivity to initial solutions and parameter selection, indicating variations in optimal solution.

Segregated Distribution of Variable Length Boxes on Different Conveyors |

Guide: Prof. Sunil Jha, Department of Mechanical Engineering, IIT Delhi *October 2022 – November 2022*

- Demonstrated expertise in Programmable Logic Control and Electro-Pneumatics logic, utilizing Sequential Function Chart coding and virtual system creation in *Automation Studio*.
- Implemented innovative features like speed offset slider, dynamic box-type change, and efficient control logic for cylinders and conveyors for segregated box distribution on different conveyors.

Calibrator level Optimization for Clinical Immunoassays using Simulation

Guide: Prof. Varun Ramamohan, Department of Mechanical Engineering, IIT Delhi *June 2021 – August 2021*

- Explored the solution space for an inverse log-logit function calibrated over 4 parameters.
- Utilized 95% confident Gaussian Haptoglobin concentrations to give the least uncertain medical decision points.

Petroleum Refinery: Processes Impact and Design Aspects

Guide: Prof. Krishnakant Agarwal, Department of Mechanical Engineering, IIT Delhi *April 2021 – May 2021*

- Documented a Literature Review of the primary functionalities in petroleum refineries and energy economics.
- Implemented a Refinery Linear Program to compute the margin maximizing crude and product slate.

Improvised Vending Cart

Sponsor: Ministry of Science and Technology *December 2021 – January 2022*

- Prototyped the fabricated Vending Cart with economically minimal feature addition for attraction and hygiene.
- Designed the Lift & Turn mechanism for 500 kg loaded cart incorporating a mechanical advantage of 67.

Graphene Nanosheet: Nanomechanical Properties Analysis

Guide: Prof. Devendra Dubey, Department of Mechanical Engineering, IIT Delhi *October 2021 – December 2021*

- Determined Young's Modulus of graphene for different loading directions, highlighting its anisotropic properties.
- Investigated the combined effects of domain size, initial crack length, and lattice orientation on graphene's yield stress and strain, contributing to a comprehensive understanding of its mechanical behavior.

Extra-Curricular Activities

Representative | Literary Club | Board For Recreational and Creative Activities, IIT Delhi: [2020-2021]
∘ Organized 4 national & 7 institute level events with 500+ participant; organized workshops for 250+ freshmen.
Representative | Content Team | Alumni Affairs and International Programs, IIT Delhi: [2020-2021]
∘ Mapped 6 newsletters to 10000+ alumni globally accompanying monthly interviews.
Winner, as the author, Inter-hostel Script Writing Competition, among 13 hostels, Dramatics Club IIT Delhi. [2020]
Runner Up, as the director, Inter-hostel Film Making Competition, among 13 hostels, Dramatics Club IIT Delhi. [2021]
Winner, as the house Kilinda, House Trophy of the Literary Club, among 13 hostels for two consecutive years. [2021]
Runner Up, as a team of 3, Inter-hostel Chess Competition, IIT Delhi. [2019]