

ARNAV KUMAR LAL

Mech @NSUT | Ex-Intern @3D Paradise | LSE Summer School '25 | Del: SMUN '25 | Ex-DRDO, Honda | ASME
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→ SUMMARY

Pre-Final Year Mechanical Engineering undergraduate (NSUT), skilled in SolidWorks, AutoCAD, ANSYS, and SimScale for FEA and CFD, with applied experience in ATV development, and shop-floor manufacturing at Honda, 3D Paradise; LSE-trained in AI research methodologies & academic dissemination; undergraduate researcher in Metal Matrix Nanocomposites using MATLAB; working knowledge of thermodynamic system design, GD&T, DfM, topology optimisation at DRDO.

→ TECHNICAL SKILLS

Engineering Software: SolidWorks, AutoCAD (2D/3D), ANSYS Mechanical, SimScale, MATLAB, Python, MS Excel, OrcaSlicer, UltiMaker Cura, Simplify3D
Design & Analysis: FEA, CFD, GD&T, Thermodynamic Modelling, Design for Manufacturing (DfM), Topology Optimisation, First-Principles Analysis, Metrology
Manufacturing & Process: Assembly Line Logistics, Parts & Inventory Control, Materials Supply Chain, FIFO Audit & Dock Management, Lean Principles, 3D Printing Operations (FDM / FFF), Reverse Engineering, ISO / ASHRAE (55 / 62.1 / 15), ASME Y14.5:2028 Standards, Statistical Quality Control, Merit Indexing
Research & Documentation: Metal Matrix Nanocomposites (MMNCs), Technical Report Writing, AI Research Methodologies, Academic Publishing & Dissemination

→ EXPERIENCE

Research Department of Mechanical Engineering, NSUT, New Delhi, India

May 2026 – Present

Undergraduate Research Fellow | Hybrid

- Conducting research on Metal Matrix Nanocomposites (MMNCs) under faculty supervision, independently verified via SolidWorks & Ansys RVE finite element analysis, extracting a stress concentration factor ($K_t=1.999\pm0.001$) across $V_{np}=0.5\text{-}5\%$, matching Eshelby's analytical limit; built a 12-parameter XGBoost/SHAP surrogate ($R^2=0.96$) coupling FE-derived K_t into fatigue life prediction, revealing cubic (3x) life amplification from agglomeration.

3D Paradise Technologies LLP, New Delhi, India

May 2026 – August 2026

Junior Mechanical Design Intern | Onsite

- Carried out ideation, reverse engineering, designing, printing, testing and transactions of various 3D printed articles for major clients in India (in sectors of defence, medicine, research, manufacturing, rapid prototyping) and abroad; utilising SolidWorks, Fusion 360, Simplify3D, Libre CAD and OrcaSlicer.
- Developed an automated batch STL slicing pipeline that calculates weight & volumes of multiple files at once, using OrcaSlicer CLI, Python (Trimesh, Openpyxl, Numpy) and Excel reporting. Continuously iterating on infill profiles, material variants, and support configurations for production accuracy.

SSPL, Defence Research & Development Organisation (DRDO), Govt. of India, New Delhi, India

May 2026 – July 2026

Summer Research Intern | Onsite

- Undertaking 1: Designed centralised HVAC and sub-zero refrigeration system for a hypothetical 3-floor, 26 TR mixed-use building (supermarket + residential + pharma cold-room); performed seasonal psychrometric analysis, CLTD-based heat load calculations (90.4 kW peak), cooling coil selection (BF 0.10, 6-row), two-stage R-32 compression sizing (CR 9.82 to 2×3.1), and energy analysis (257,127 kWh/year) under ASHRAE 55/62.1/15 compliance.
- Undertaking 2: Performed SIMP-based topology optimisation on a thin-walled AISI 1020 automotive door panel in SolidWorks, identifying critical load paths and achieving 40% mass reduction within stress and displacement limits (Calabrese, Keerthi, Woldseth et al.); extended to thermo-structural FEA on an SS316 LN2 vessel (-165°C , 200 psi), quantifying 1,049 MPa peak von Mises at the nozzle-sphere junction and reducing stress 5.4% via multi-location fillet (FoS: 1.11 to 1.18).

Honda Cars India Ltd. (HCIL), Tapukara, Rajasthan, India

Dec 2025 – Feb 2026

Winter Internship Trainee, Parts & Logistics Control (PLC) | Onsite

- Coordinated part logistics and parts-chasing; collaborated with cross-functional mechanical, electrical, and systems teams; gained hands-on exposure to fabrication, CNC machining, wiring, and HPDC/LPDC die casting. Technical Research on Machine Handling Equipment (Automatic & Manual).
- Resolved a stacktainer storage deficit across a $300\times8\text{ m}^2$ warehouse area, increasing unit count by 28.6% while limiting unpacking area reduction to 7.16%; conducted FIFO audit across dock bays identifying part delays of up to 253 days; analysed milkrun truck packing efficiencies ranging from $<35\%$ to $>85\%$.

Team Daedalus Racing, NSUT (erstwhile NSIT Motorsports), New Delhi, India

Aug 2025 – Present

Mechanical Designer → Powertrain Engineer | Onsite

- Collaborated within Team Daedalus Racing to develop a competition ATV using first-principles stress-strain, thermal, tolerance, and cost analysis; 3D CAD in SolidWorks and CAE in ANSYS; rollover impact analysis on a 280 kg vehicle at 3 m drop yielded 3,579.33 N force, 212.3 MPa stress, FoS 2.898, exceeding frontal/side/rear safety margins by 137/106/88%; team secured AIR 2 (Combustion) across 9 competition awards.
- Automobile Parts & Component Modelling (SAE BAJA Context): Personally modelled core ATV subsystems in SolidWorks alongside team work, including double-wishbone suspension, gearbox differential, inline-4 engine, chassis subframe, and AISI 4130 roll cage; undertaken independently.

→ TECHNICAL PROJECTS

- Heat Sink Thermo-Structural Analysis & Design Optimization:** Extended Abbas et al (2024). Designed a 6-fin tapered chord-array heat sink in SolidWorks; conjugate CFD at 3 m/s revealed actual $h = 25.04\text{ W/m}^2\text{K}$ vs. classically assumed $15\text{ W/m}^2\text{K}$ (67% underestimation); staggered 3 mm perforations cut thermal resistance by 4.3% removing only 0.86% of fin volume; thermo-structural coupling yielded 22 MPa root stress.
- Industrial Shed Modelling and Drawing Set (Freelance):** Produced complete SolidWorks & Fusion 360 model and an 8-sheet fabrication drawing set for a $47,910\times25,598\text{ mm}$ mono-pitch steel shed; 12 portal frames, $152\times152\times6\text{ mm}$ MS SHS columns, Pratt-pattern $76.2\times76.2\text{ mm}$ SHS trusses (762 mm midspan depth), 0.5 mm ANMS roof sheet, 8 IS 3103-referenced turbo-ventilators in 4×2 grid; all member sizing as per civil engineering client requirement.

→ EDUCATION

Netaji Subhas University of Technology (NSUT), New Delhi, India

2024 – 2028

Bachelor of Technology, Mechanical Engineering, JEE MAIN 2024 96%ile.

London School of Economics (LSE), London, United Kingdom

June 2025

Summer School, Research Methodologies in Data Science & Artificial Intelligence, Grade: A-

→ ACCOMPLISHMENTS & CERTIFICATIONS

- Delegate, Singapore MUN 2025, National University of Singapore:** Selected amongst 800+ candidates for a college-funded conference to represent India.
- Ongoing Specialisation, Arizona State University:** Material Science for Advanced Engineering Applications | Coursera
- CFD of a Centrifugal Pump & FEA Optimisation of a Mechanical Bracket using SimScale:** Certified Guided Project | Coursera
- Essentials of AutoCAD:** 2D, 3D, and isometric drafting and machine design | CADD Centre, Janakpuri, New Delhi
- GD&T with Manual Design & SolidWorks:** Certified course | Udemy