NAMAN JAIN

Atlanta, GA (404) 447-6825 njain376@gatech.edu linkedin.com/in/naman-jain-meche

EDUCATION

Georgia Institute of Technology Atlanta, GA
Master of Science in Mechanical Engineering *May 2027 (Expected)*

- **Relevant Coursework:** AI in Design & Manufacturing, Modeling & Sim. in Design, Designing Open Eng. Sys.

Birla Institute of Technology and Science (BITS) Pilani Pilani, India
Bachelor of Engineering in Mechanical Engineering | GPA: 3.75/4.00 *May 2025*
Minor in Entrepreneurship

- **Relevant Coursework:** Fluid Mechanics, Heat Transfer, Applied Thermodynamics, CAD, Advanced Manufacturing, Engines Motors and Mobility

TECHNICAL SKILLS

Programming	Python, MATLAB, C/C++, R, SQL, JavaScript, HTML/CSS, Raspberry Pi, Linux
Simulation	ANSYS (Fluent and Mechanical), COMSOL, Basilisk (Open source CFD), Palabos
CAD & Design	SolidWorks, Fusion 360, AutoCAD, 3D Printing (SLA, FDM)
Frameworks	PyTorch, TensorFlow, Neo4j, Langchain, Streamlit, Git, Anaconda

PROFESSIONAL EXPERIENCE

Graduate Research Assistant | *Georgia Tech, Atlanta* **Aug 2025 – Present**

- Developed **3D CFD models** in Basilisk using **VOF** and **adaptive mesh refinement** to characterize droplet secondary breakup under surfactant-driven Marangoni effects, surface tension, and viscous interactions
- Implemented **parallelized HPC simulations** with up to **800K elements**, executing batch jobs for parametric exploration of multiphase flow dynamics
- Performed advanced post-processing and **multiphase flow analysis** to extract interfacial dynamics, validating propulsion system analytics

Research Intern – Microfluidics | *ÉNS Paris-Saclay, France* **Aug 2024 – Dec 2024**

- Designed and fabricated **microfluidic channel systems** using soft lithography techniques for **real-time analysis** of circulating tumor cells under laminar flow conditions
- Cultured and characterized **HuH7 cell lines**, optimizing flow rates and biocompatibility for experimental validation
- Developed **image acquisition and computational analysis framework** to quantify cell biomechanical properties and deformation patterns, bridging experimental platforms with data-driven insights

Research Intern - Thermal | *Nanyang Technological University, Singapore* **Feb 2024 – Jul 2024**

- Optimized **Phase Change Material (PCM)** formulations with nano-additives, extending cooling duration by **40%** and reducing logistics costs by **25%**
- Conducted **20+ transient thermal simulations** using ANSYS to evaluate melting behavior and material performance under dynamic conditions
- Translated complex thermal physics results into actionable design modifications through stakeholder presentations

Summer Intern – Operations | *Delhi Metro Rail Corporation, India* **May 2023 – Jul 2023**

- Applied **Kaizen principles** to conduct process audits across two major substations, identifying critical inefficiencies
- Enhanced system reliability by **5%** & reduced energy waste by **3%** through preventive maintenance and optimization measures
- Conducted root cause analysis to improve equipment performance and reduce downtime across mechanical systems

TEACHING AND MENTORING EXPERIENCE

Undergraduate Teaching Assistant | *BITS Pilani, India* **Jan 2024 – May 2025**

- Supervised **160+ undergraduate students** across 3 mechanical engineering courses (ME F219, ME F315, ME F341), designing assessments and facilitating comprehension

- **Designed and evaluated** course assessments to monitor & support student comprehension and academic progress effectively
- Conducted engaging doubt-clearing sessions, providing personalized support and clarification to enhance student learning outcomes

Senior Student Guide, Clean Energy Research Group | *BITS Pilani, India* **Aug 2023 – May 2025**

- Supervised junior researchers in computational lab, collaborating with PhD students to provide **targeted support and mentorship**
- Coached **over 20 undergraduate researchers** with crucial research concepts and software including CFD, ANSYS, and MATLAB
- Fostered collaborative research experience by welcoming students from **diverse disciplines** and facilitating several group projects

MAJOR PROJECTS

Surrogate-Assisted RBDO of a 2D Transient Heat Sink under Uncertainty **Aug 2025 – Present**

- Developed **MLP neural network surrogate** trained on **300 ANSYS transient simulations**, achieving near perfect model fit with StandardScaler normalization
- Implemented **Hasofer-Lind Rackwitz-Fiessler (HL-RF) algorithm** with manual gradient computation and **Rosenblatt transformation** to u-space, optimizing fin thickness for minimum mass subject to **99% reliability constraint**
- Generated training dataset using **Latin Hypercube Sampling with random-cd optimization** across uncertain parameters; performed **ANOVA** and residual analysis on polynomial regression for statistical validation

Flexible Electrodynamic Dust Shield (EDS) Test Rig Design **Aug 2025 – Present**

- Developed vacuum-compatible test platform (**10^{-7} Torr**) applying **bio-inspired design** across **60+ concepts**, delivering reliable material performance data
- Optimized system cooling through radiative heat transfer analysis & **FEA verification** under ultrahigh vacuum conditions
- **Led manufacturing and testing**, executed simulations, developed **2D drawings and 3D CAD models**, and produced **3D-printed prototype** for design verification

Intelligent RAG-Based Knowledge Management System **Aug 2025 – Present**

- Engineered **Neo4j graph-based knowledge system** to organize technical documentation into semantically searchable databases
- Developed **NLP pipeline** with cosine similarity matching and pretrained models achieving **95% query accuracy**
- Built **interactive chatbot** using Langchain and Streamlit for domain experts to perform semantic searches on unstructured data

Automated Sample Sorting Using Computer Vision and Robotics **Aug 2025 – Present**

- Developed custom **deep learning CV pipeline** for real-time sample classification and detection based on visual features
- Integrated **Raspberry Pi-based embedded control** with **UR5 collaborative robot** for autonomous sample handling and processing
- Automated repetitive laboratory tasks of sorting test tubes based on sample colors while maintaining high accuracy and precision

Thermal Management for EV Batteries using PCM & Hybrid Nanofluids **Nov 2023 – Jan 2025**

- Engineered **passive-active hybrid cooling system** reducing battery temperature by **15%** and extending EV range by **10%**
- Executed **digital-twin simulation methods** to model vibration effects and optimize reliability for real-world operation
- Instrumented and tested system on **custom in-house EV prototype**, correlating simulation predictions with field data; secured **$1,500 funding**

Electric Vehicle Aerodynamic Design and Optimization **Aug 2022 – Dec 2023**

- Executed steady-state **CFD analysis** using **k-omega SST turbulence modeling** and MATLAB post-processing, reducing drag coefficient from **0.29 to 0.10**
- Integrated aerodynamic results with **structural FEA** across iterations to balance efficiency and manufacturing feasibility
- Validated predictions through wind tunnel testing and track evaluation, demonstrating **10% overall efficiency improvement**

PUBLICATIONS & CONFERENCE PRESENTATIONS

Selected Peer-Reviewed Publications:

- N. Maurya, **N. Jain**, T. Bhatt, S. Kumar, and S. Bhattacharyya, "Microchannel heat exchangers," in *Heat Exchangers - Fundamentals, Design, Applications and Performance*, CRC Press, 2025, pp. 220–240, doi: 10.1201/9781003509837-8.
- S. Sripattanapipat, **N. Jain**, S. Bhattacharyya, V. Chuwattanakul, P. Naphon, and S. Eiamsa-Ard, "Flow topology and thermal mechanism in turbulent channel flow with tapered V-shaped baffles," *Case Studies in Thermal Engineering*, vol. 66, p. 106610, Jun. 2025, doi: 10.1016/j.csite.2025.106610.
- S. Bhattacharyya, B. Souayeh, J. Saad, Z. Alherz, **N. Jain**, and T. Bhatt, "Numerical analysis of magnetic nanofluid flow in electronic cooling systems under magnetic influence," *Journal of Thermal Analysis and Calorimetry*, Apr. 2025, doi: 10.1007/s10973-025-14180-1.
- T. Bhatt, **N. Jain**, and Y. K. N. Eddie, "Sustaining vaccine potency in cold chain logistics: Numerical analysis of extended cooling duration in glycerol-infused N-tetradecane phase-change materials," *Fluids*, vol. 10, no. 2, p. 32, Feb. 2025, doi: 10.3390/fluids10020032.
- T. Bhatt, J. Shah, **N. Jain**, and S. Bhattacharyya, "Exergy and entropy analysis of heat exchanger under mechanical vibration and magnetic field," *ASME Journal of Heat and Mass Transfer*, pp. 1–30, Sep. 2024, doi: 10.1115/1.4066505.
- S. Bhattacharyya, N. Maurya, **N. Jain**, and D. K. Vishwakarma, "Enhancing EV battery cooling using magnetic nanofluid and external magnetic field synergies," *Journal of Thermal Analysis and Calorimetry*, vol. 149, no. 24, pp. 14971–14990, Dec. 2024, doi: 10.1007/s10973-024-13829-7.
- S. Bhattacharyya, **N. Jain**, T. Bhatt, H. Yasmin, and M. Sharifpur, "Mini-channel cooling system for solar PV panels with hybrid magnetic nanofluid and magnetic field," *Results in Engineering*, vol. 20, p. 101473, Dec. 2023, doi: 10.1016/j.rineng.2023.101473.

Conference Presentations:

- **Oral Presentation:** S. Bhattacharyya, **N. Jain**, T. Bhatt, S. Ghosh, and A. C. Benim, "Heat transfer augmentation in a mini-channel using magnetic nanofluid and magnetic vortex," in *Proc. 7th Int. Conf. Computational Methods for Thermal Problems (ICCHMT 2023)*, Düsseldorf, Germany, Sep. 2023, doi: 10.1007/978-3-031-66609-4_1.
- **Poster Presentation: N. Jain**, N. Maurya, S. Bhattacharyya, T. Bhatt, and D. K. Vishwakarma, "Enhancing heat transfer in minichannel nanofluid flow through strategic magnetic field application: A study on convection enhancement in NiO_2 + H_2O nanofluid," presented at ICFTES 2024, Calicut, India, Jun. 2024.
- **Poster Presentation:** T. Bhatt, **N. Jain**, and Y. K. N. Eddie, "PCM-inspired adaptive learning: ML framework for personalized education," presented at AMDES 2025, Singapore, Jan. 2025.

Complete list of publications available at Google Scholar

LEADERSHIP & EXTRACURRICULAR ACTIVITIES

Secretary, ISHRAE Student Chapter | *BITS Pilani, India* **Feb 2024 – Oct 2024**

- Directed team of **25+ members** to establish India's first ISHRAE student chapter, fostering HVAC industry engagement
- Led development & funding acquisition for **PCM-based milk container**, validating impact through dairy partnership testing
- Curated high-impact competition and technical talk at annual college Techfest, spotlighting HVAC innovations

Head of Structure & Dynamics, Team BITS Formula Racing | *BITS Pilani, India* **Jan 2023 – Mar 2024**

- Recruited and trained team of **12 students** from 100+ applicants in **CFD simulation** and structural validation
- Led **carbon-fiber chassis manufacturing**, achieving drag coefficients of **0.1–0.29** for high-performance prototypes
- Collaborated cross-functionally with design, testing, & fabrication teams to ensure manufacturability and performance targets

Volunteer, National Service Scheme | *BITS Pilani, India* **Aug 2022 – Nov 2023**

- Executed **100+ hours** of social service utilizing hydrogel technology for water extraction, addressing regional water scarcity
- Spearheaded sustainability projects including fluorine measurement and bee population assessment initiatives
- Supported NSS annual blood donation camp, ensuring seamless event coordination and maximizing community participation

Executive Committee Member, Mechanical Engineering Association | *BITS Pilani, India* **Feb 2022 – Dec 2023**

- Organized events for annual Techfest at BITS Pilani while coordinating with **50+ colleges** for smooth execution
- Designed and managed three-round CAD competition with real-world engineering challenges to boost creative thinking
- Conducted workshop to demonstrate and teach use of Fusion 360 software, offering hands-on tutorials and feature insights