Alok Ranjan

Contact Information

M.Tech, 2nd Year
Department of Aerospace Engineering
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Education

Year	Degree	Institute/School	CPI/%
2024-Present	**M.Tech Aerospace Engineering**	**Indian Institute of Technology, Kanpur**	6.73* /10.0
2018-2022	**B.Tech Aerospace Engineering**	**Indian Institute of Space Science and Technology, Thiruvananthapuram**	6.11/10.0
2017	Senior Secondary	Prayas Boys Residential School, Raipur	68.8%
2015	Secondary	Loyola Higher Secondary School, Kunkuri	85.16%

* At the end of 2nd semester

Academic Achievements

- Selected for B.Tech in Aerospace Engineering at **Indian Institute of Space Science and Technology** (IIST), Thiruvananthapuram through **JEE Advanced (2018).**
- Qualified **GATE 2024 (Aerospace)** and selected for M.Tech Propulsion at **IIT Kanpur .**

Research Projects & Experience

M.Tech Thesis: Numerical Investigation of Electrostatic Spray Dynamics *(July'25 - Present)*

Guide: *Dr. Ashoke De, IIT Kanpur*

- Developing a **CFD framework in OpenFOAM** for **electrostatic multiphase sprays**.
- Performing large-scale **CFD simulations using HPC** to study spray behavior and stability.
- Analyzing **droplet morphology, distribution, and stability**.

B.Tech Thesis: Failure Analysis of Bio-Inspired Self-Similar Hierarchical Composites *(Jan'22 - May'22)*

Guide: *Dr. Anup S, IIST Thiruvananthapuram*

- Performed **FE simulations in ABAQUS** to study **strain fields and stress distribution**.
- Computed **stiffness** using **computational and analytical methods**.
- Designed and fabricated **1H and 2H hierarchical composites via 3D printing** and conducted **tensile tests**.

Summer Internship: CFD Analysis of 2D Flow past Square Cylinder *(June'21 - Oct'21)*

Guide: *Dr. Manu K V, IIST Thiruvananthapuram*

- Simulated **unsteady flow and vortex shedding** at low Reynolds numbers using **OpenFOAM**.
- Computed **lift/drag coefficients and Strouhal numbers**, validated with benchmark data.

Course Project: Aerospace Vehicle Design *(Aug'21 - Nov'21)*

Mentored by: *Dr. Ayyappan G, VSSC, ISRO and Dr. Manoj T Nair, IIST, ISRO*

- Designed and optimized **IAD geometry, parachutes**, Developed codes for trajectory analysis.

Course Project: Parallel Computation for Sparse Matrix System *(Jan'25 - May'25)*

Instructor: *Dr. Ashoke De and Dr. Malay K Das, IIT Kanpur*

- Implemented **serial, OpenMP, and MPI solvers** for sparse matrices and **benchmarked performance and scalability** using **PETSc**.

Key Skilled Areas

- **Computational Fluid Dynamics**
- **Combustion**
- **Parallel Programming & Optimization**
- **Numerical Linear Algebra & Iterative Solvers**

Technical Skills

- **C, C++, Python, MATLAB**
- **OpenFOAM**
- **PETSc, OpenMPI, OpenMP**
- **Git/GitHub, LaTeX, Matplotlib, ParaView**

Position of Responsibility

- Appointed as Teaching Assistant (TA) under the Head of Department, AE, IIT Kanpur
- Coordinator at Dhanak Fest, IIST Thiruvananthapuram (2019) – Managed event planning, coordinated teams, and handled logistics for cultural/technical activities.

Relevant coursework

M.Tech: Combustion, Heat Transfer, Aerodynamics, Compressible Flow, Parallel Computation, Numerical Linear Algebra, Computational Methods.
B.Tech: Air-Breathing Propulsion, Thermodynamics, Fluid Mechanics, Heat Transfer, Industrial Engineering,Principles of Management Systems, Optimization Techniques in engineering.