Gaurav **Gupta**

Senior Undergraduate, Aerospace Engineering

Indian Institute of Space Science and Technology, Thiruvananthapuram

(+91) 9083722796 | gauravxpgupta@gmail.com | https://airwarriorg91.github.io/ | airwarriorg91 | gauravgupta030

Summary

A senior undergraduate student majoring in aerospace engineering at IIST, I'm focused on bio-inspired flight, aerodynamics, and control systems. My research blends nature's ingenuity with cutting-edge aerospace technologies. Motivated to learn new skills and take on challenges, I have strong expertise in aerodynamics, computational fluid dynamics, programming, and aircraft design. Additionally, I excel in leadership, teamwork, and management, driving innovative and collaborative project outcomes.

Education

Indian Institute of Space Science and Technology

Thiruvananthapuram, India

B.Tech. in Aerospace Engineering — *Dec. 2021 - Present*

- Current Cumulative Grade Point Average (CGPA): 8.21/10
- Relevant coursework: Aerodynamics, Computational Fluid Dynamics, Aircraft Design, Flight Dynamics & Control, Optimization Techniques, Astrobiology
- Relevant Labs: Aerodynamics Lab, Modelling and Simulation Lab, Flight Mechanics Lab, Propulsion Lab, and Programming
- Extracurricular Activities: Aeroclub, Conscientia and Basketball

Kendriya Vidyalaya No.1 AFS Kalaikunda

Kharagpur, India

High School (XI & XII) — *Jul. 2019 - May. 2021*

- Graduated as the topper of school with 97.4% in the CBSE AISSCE examination.
- Served as the School Vice Captian and School Captain in XI and XII grade respectively.
- Courses: Mathematics, Physics, Chemisty, Computer Science, and English.

Kendriya Vidyalaya No.1 AFS Kalaikunda

Kharagpur, India

AISSE (Xth Board) — *Apr. 2018 - May. 2019*

- Graduated as the topper of school with 98.8% in the CBSE AISSE examination.
- Rank 1 in West Medinipur district and Rank 4 in West Bengal state.

Engineering Research Experience

Indian Institute of Technology, Kharagpur

Kharagpur, India

Research Intern — *Mar. 2023 - Present*

- Investigating the aerodynamics of birds through computational methods with implementation in aircraft design.
- Conducted high-fidelity DNS on HPC (Paramshakti and Virgo) using Incompact3D and NEK5000.
- Pursued under the guidance of Dr. Sandeep Saha, IIT KGP and Dr. Manu KV, IIST.

Open-Source Contributions

Incompact3D

CFD, Fortran

High-order finite difference flow solver — *GitHub*

- Developed a fortran subroutine to calculate lift and drag forces for a 3D immersed body simulations using Incompact3D.
- Working on improving the performance of importing STL files for high-fidelity simulations using Incompact3D.

PyMech

CFD, Python, NEK5000

A Python software suite for NEK5000 and SIMSON — *GitHub*

- Improving the in-built open_dataset function to support unstructured datasets produced using NEK5000.
- Used for post-processing of high-fidelity simulation data using NEK5000.

TurbCourse

CFD, Python, NEK5000

A course in Turbulence simulation — *GitHub*

- Improved the performance of POD and DMD modules for high-fidelity simulation data using NEK5000.
- Added capability for conducting frequency analysis of the POD modes.
- Uses PyMech for reading/writing of NEK5000 data.

IIST-Beamer-Template

LaTeX, Beamer

A Beamer template for IIST students — *GitHub, Overleaf*

- Created a minimal and simple beamer template for IIST students.
- It provides a structured and visually appealing way to create presentations that meet academic and professional standards.

Projects

Aerodynamics of Avian Tails

CFD, Fortran, Python

Research Internship — *Mar 2023 - Present*

- High-fidelity simulations were conducted to understand the role of avian tail in gliding flight.
- The Common Swift was modelled and 2D-DNS simulations were conducted using NEK5000.
- RANS-assisted 3D DNS were conducted using SU2 and NEK5000.

Design and development of a Loitering Munition

Aircraft Design, Python

AE412: Aerospace Vehicle Design — *Aug 2024 - Nov 2024*

- A low-cost loitering munition with a payload capacity of 2 KG is being designed and developed.
- Undertaken conceptual and preliminary design of the loitering munition.

Development of 3D Force calculation subroutine for Incompact3D

CFD, Fortran, HPC

IIT Kharagpur — *May 2024*

- A fortran subroutine was developed to enable 3D forces calculation in Incompact3D, a finite difference solver for N-S equations.
- The subroutine was developed and merged with the original code as an open-source contribution on GitHub.
- Open-source and available on GitHub.

FreeFEM-Euler

CFD, FreeFEM++, GMSH

IIT Kharagpur — *Jun. 2024*

- An incompressible flow solver based on Artificial Compressibility Method was developed using FreeFEM++.
- The code is capable of solving 2D and 3D problems based on in-built FreeFEM++ and GMSH meshes.
- Open-source and available on GitHub.

UHF/VHF Standalone Antenna Mast Retraction Mechanism

Mechanisms, CAD

SSPACE Labs — *Dec. 2022*

- The institute's SSPACE Labs have been using an UHF/VHF Standalone antenna for establishing communication with the INSPIRESAT-1 satellite.
- A retraction mechanism for the antenna was designed such that it can be retracted easily for maintainence purposes.

Performance Analysis of Boeing C17 Globemaster

Aircraft Performance

AE111: Introduction to Aerospace Engineering — *Feb. 2022*

- The performance of C17 Globemaster was analyzed in this project.
- The various performance parameters presented by the manufacturer and experimentally tested by operators were analysed using theoretical analysis.

Thrust Vectoring Nozzles of Sukhoi Su30-MKI

Mechanisms, CAD

AE131: Basic Engineering Lab — *Feb. 2022*

- The mechanism of the Thrust Vectoring Nozzles of Sukhoi Su-30 MKI was studied under this project as mechanical report.
- A CAD model of the mechanism was also made in Fusion 360 and it was simulated.

Skills

Modelling and Computer Aided Design	DS Solidworks, DS Catia, Autodesk Fusion 360, Autodesk Autocad, Blender
Computational Fluid Dynamics	Incompact3D, NEK5000, SU2, Ansys Fluent, XFLR5, GMSH, Coreform Cubit, Paraview, HPC
Programming	Python, MATLAB, FreeFEM++, Fortran, Julia, C++, LaTeX, Linux, GitHub
Creative	Adobe Illustrator, Inkscape and Powerpoint
Soft Skills	Passionate, Hardworking, Determined, Motivated, Punctual, Organized, Focused
Language	English, Hindi, Bengali

Certificates

Ongoing **High Performance Computing,** IIT Bombay and NPTEL

Dec, 2022 **Machine Learning with Python (Honors),** IBM and Coursera

Oct, 2022 **Design of Fixed Wing Unmanned Aerial Vehicle (Topper),** IIT Kanpur and NPTEL

Nov, 2022 **Aircraft Design,** IIT Bombay and NPTEL

May, 2022 **Mastering Programming with MATLAB,** Vanderbilt University and Coursera