# Gaurav **Gupta**

Senior Undergraduate, Aerospace Engineering

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## 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): 8.07
- Interested courses: Aerodynamics, Computational Fluid Dynamics, Aircraft Design, Flight Dynamics & Control and Programming
- Extracurricular Activities: Aeroclub 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 Captian 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.
- Courses: Mathematics, Science, Social Science, English, Hindi, and Information Technolgy.

## Experience

### Incompact3D

*GitHub*

Open-Source Contributor — *Jul. 2024 - Present*

- 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.

### Indian Institute of Technology, Kharagpur

*Kharagpur, India*

Research Intern — *Mar. 2022 - Present*

- Investigating the aerodynamics of birds through computational methods with implementation in aircraft design under the guidance of Dr. Sandeep Saha, IIT KGP and Dr. Manu KV, IIST.
- Conducted high-fidelity direct numerical simulations on Paramshakti and Virgo clusters of IIT KGP and IIST respectively using Incompact3D and NEK5000.

### Conscientia, IIST

*Thiruvananthapuram, India*

Chief Coordinator — *Mar. 2023 - Nov. 2023*

- Organized and managed the 14th edition of IIST's technical and astronomical festival, Conscientia, from September $22^{nd}$ to $25^{th}$, 2023.
- Conducted competitions and workshops, attracting over 1,000 student participants from across India.
- Oversaw a budget of approximately 22 lakhs, generating a profit of 4 lakhs.

### Conscientia, IIST

*Thiruvananthapuram, India*

Website Coordinator — *Aug. 2022 - Nov. 2022*

- Developed and managed the website of 13th edition of IIST's technical and astronomical festival, Conscientia 2023.
- Designed the front-end of the website using Vanilla and Django.

### AeroClub, IIST

*Thiruvananthapuram, India*

Student Member & Student Coordinator — *Mar. 2022 - Nov. 2023*

- Designed and built fixed-wing and rotor-based model aircrafts.
- Conducted workshops on "UAV Design" for school students with a pratical glider building session.
- Conducted sessions for junior members of the club on UAV Design including glider and water-rocket design competitions.

## Skills

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|---|---|
| **Modelling and Computer Aided Design** | DS Solidworks, DS Catia, Autodesk Fusion 360, Autodesk Autocad, Blender |
| **Computational Fluid Dynamics** | Incompact3D, NEK5000, 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

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

## Publications

**Base and Exponent Prediction in Mathematical Expressions using Multi-Output CNN** *arXiv*
Salam, Md. Laraib, Balsaraf, Akash S., **Gupta, Gaurav** *2024*

**Determining surface tension of various liquids and shear modulus of paper using crumpling effect** *Journal of Emerging Investigators*
**Gupta, Gaurav**, Salam, Md. Laraib *2021*

**Formation and sticking of air bubbles in water in d-block containers.** *Journal of Emerging Investigators*
**Gupta, Gaurav**, Salam, Md. Laraib *2021*

## Projects

**Design and devlopement of a Loitering Munition** *Aircraft Design, Python*
AE412: Aerospace Vehicle Design *Aug 2024-Present*

- 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.

**Developement 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 NS 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.

**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.

**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.