

Divyanshi Bansal

SENIOR UNDERGRADUATE · INDIAN INSTITUTE OF TECHNOLOGY KANPUR

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Education

Exp. 2025 **Bachelor of Technology**, Department of Aerospace Engineering, IIT Kanpur, India

Minors in Controls, Department of Electrical Engineering

CPI: 8.5/10

July 2021 **Grade XII (CBSE)**, Mantora Public School, Kanpur

Percentage: 95.6 %

May 2019 **Grade X (ICSE)**, St. Mary's Convent High School, Kanpur

Percentage: 98.0 %

Research Interests

Unmanned Aerial Vehicles(UAVs), Aerial Robotics, Vertical Take-Off Landing(VTOL) Configurations, Controls and Navigation, Machine Learning Applications

Publications & Posters

- Bhatnagar, K., **Bansal, D.**, Arya, B., and Abhishek (May 2024). **Design and Development of Swashplateless Micro Helicopter with Pitch-Lag Coupling**. Proceedings of the *Vertical Flight Society 80th Annual Forum & Technology Display*, Montreal, Canada DOI: 10.4050/F-0080-2024-1291 📄
- Poster Presentation*: **Bansal, D.**, Pathikonda, G. (July 2024). **Suction/Blowing Control System to Impose Complex Pressure Gradients in a Wind Tunnel**. Presented at the *SURI Research Symposium*, Arizona State University, United States 📄

Research Experience

SURI'24 Intern | Arizona State University

Tempe, United States

SUCTION/BLOWING CONTROL SYSTEM TO IMPOSE COMPLEX PRESSURE GRADIENTS IN A WIND TUNNEL 📄

Supervisor: **Prof. Pathikonda**, CMAT Lab, School for Engineering of Matter, Transport and Energy

[May '24 - Jul '24]

- Constructed a **4*4 array of computer-controlled fans** mounted atop the wind-tunnel for precise **airflow control**
- Developed an **open-loop control** with **MicroPython** on **Raspberry Pi Pico W** to send PWM signals to the fans
- Conducted **Particle Image Velocimetry** experiments to calculate pressure distribution from the velocity profiles
- Validated system performance by obtaining experimental pressure measurements using **23 pressure transducers**

Undergraduate Researcher | IIT Kanpur

Kanpur, India

DESIGN AND DEVELOPMENT OF SWASHPLATELESS MICRO HELICOPTER 📄

Supervisor: **Prof. Abhishek**, Helicopter and VTOL Lab, Dept. of Aerospace Engineering, IIT Kanpur

[Jun '23 - Present]

- Developed **Arduino** code for **cyclic blade pitch variation**, integrating motor angular position with speed control
- Validated roll-pitch variation in Vertiq's UP12 Propeller System through **load cell testing** and performance analysis
- Conducted comprehensive and precise **weight estimation and optimization** for developing a **250g** ultralight UAV
- Tested the MAV with the UP12 propeller system for **yaw balance** using **ArduPilot**, by precisely optimizing yaw gain
- Implementing the cyclic sinusoidal input using **serial communication** between the motor module and **Pixhawk**

Student Research Associate | IIT Kanpur

Kanpur, India

FINE-GRAINED POROUS MEDIA CONVECTION: DEVICE COMMUNICATION USING LABVIEW (DST-SERB)

Supervisor: **Prof. Madanan**, Exp. Thermofluids Lab, Dept. of Mechanical Engineering, IIT Kanpur

[May '23 - Jul '23]

- Implemented **multi-channel, multi-device, continuous data acquisition** to obtain temperature readings
- Maintained the temperature of the heater at the required set point using **PID control** mechanism in **LabVIEW**
- Established the communication with **programmable DC power supply PSD7303A** using the **VISA** functions
- Extended this communication among **27 thermocouples** with **6 heater units** and **3 multi-channel power supplies**

Key Projects

Coupled Trim Solution for UH-60A Black Hawk Helicopter

Kanpur, India

Supervisor: **Prof. Abhishek**, Dept. of Aerospace Engineering, IIT Kanpur

[Course Project]

- Developed **numerical solutions for BEMT** in helicopter rotor analysis, including various twist configurations
- Performed **coupled trim analysis**, integrating blade flap dynamics to analyze forces, moments and angles

- Generated training data via **Latin Hypercube Sampling** and optimized the **PINN model** through iterations
- Designing an **artificial neural network** for simplifying the Computational Fluid Dynamics model for flow transfer

- Implemented **PID controller** for satellite attitude control, enhancing settling time and reducing overshoot time
- Improved the mission outcomes by **optimizing PID gains**, enhancing fuel efficiency and pointing accuracy

Scholastic Achievements

Feb 2024 **Selected as 1 of 44 students** globally for the **SURI'24** program at Arizona State University

May 2024 **Received the Aviation Development Award**, nominated by the HOD, Dept. of Aerospace

Oct 2021 **Secured All India Rank in top 1 percentile** in JEE Advanced among 1.2 million aspirants

Arizona, USA
IIT Kanpur
India

Skills

Programming Languages

C/C++, Python, MATLAB, JAVA

Major Utilities

LaTeX, NI LabVIEW, SolidWorks, AutoCAD, ANSYS, Arduino, PX4, Gazebo

Libraries

NumPy, Pandas, Scikit-learn, TensorFlow, PyTorch

Relevant Coursework

Aerospace Engineering

Aerodynamics | Thermodynamics | Propulsions
Fluid Mechanics And Rate Processes | Dynamics
Flight Mechanics | Helicopter Theory: Dynamics And Aeroelasticity
Manufacturing Processes I & II | Aeromodel Design And Fabrication

Computing and ML

Fundamentals of Computing | Machine Learning For Engineers
Advanced Topics In Machine Learning

Control Systems

Introduction to Electronics | Basics Of Modern Control Systems
Aircraft Control Systems | Signal, System and Networks[#]

Mathematics

Linear Algebra and Ordinary Differential Equations | Partial Differential Equations
Applied Probability And Statistics[#] | Complex Variables | Real Analysis

(# — Ongoing)

Leadership Activities

Manager | Sustainability Community, IIT Kanpur

[Jun '23 - Jun '24]

Prepared **IITK's first sustainability report**, comprising of an action plan for making IITK campus **carbon neutral**

Drafted a **proposal** with administratively feasible initiatives and solutions to attain **net-zero waste** in IIT Kanpur

Student's Senate Nominee | Departmental Under Graduate Committee, IIT Kanpur

[Oct '23-Present]

Served as a **vital interface** between UG students and administration, ensuring fast resolution of academic issues

Hosted a departmental **Open House session**, collating and presenting feedback from undergraduate community

Extracurricular

Awards And Recognitions

Secured **State Rank 1** and **Olympiad Rank 8** in **Brilliant International Olympiad of English Language**, Level 1

Represented the school and was recognised as **District Rank 5** in the English Debate competition in 2018

Creative Writing

Co-authored an anthology, **Wanderlust**, published by Quill House Publication and released on **Amazon**

Self composed poems featured in **Dandelion**, bi-monthly newsletter of IITK and **Echoes**, school magazine

Social Work

Volunteered to teach English to underprivileged students of class 3 during the summer term of 2023 at **Prayas**, IITK

Made yearly visits through school to underprivileged areas, and organised engaging activities and **donation drives**

Society Membership

Society of Women Engineers (SWE)