# Department of Aerospace Engineering

## Research Topics from Faculty Members Interested in New PhD Students

## Admission Cycle: Dec 2026



# Aerodynamics

# Dhwanil Shukla



- Hiring this season? **Not actively**
- **Research Areas:**
  - Rotor Aerodynamics
  - Experimental Aerodynamics
  - UAV Design
- **Skills/experience**:
  - Good grasp of fluid mechanics/aerodynamics, design of experiments, design & fabrication of electro-mechanical systems, signal processing and interpretation.
- More information: https://sites.google.com/iitb.ac.in/exp-aero-lab/

# Prof. Vineeth Nair



Hiring this season?: **Yes**

Research Areas: Thermoacoustics, Supercritical/transcritical fluid flows, Optical flow diagnostics

Research projects:

Synchronization behaviour in confined premixed flames

- Skills required: Experimental background, basic,  critical thinking aptitude.
- Preferred skills: Fundamentals of acoustics and combustion, working knowledge of PLIF/PIV laser systems.

URL to Lab Website / Profile: https://www.aero.iitb.ac.in/~vineeth

Primary nature of research project: Experimental

# Prabhu Ramachandran



- Hiring this season? **Yes**
- **Research Areas:**
  - Particle and meshless methods for continuum mechanics
  - Parallel and high-performance scientific computing (HPC)
  - AI and ML for PDEs
- **Skills/experience**: Background/interest in mathematical physics, numerical methods, and scientific computing
- More information: https://www.aero.iitb.ac.in/~prabhu/

# Prof. Aniruddha Sinha



Hiring this season?: **Yes**

Current Research Focus: Reduced-order modelling of flows and Aeroacoustics

Skills/experience: Background/interest in mathematical physics, numerical methods, scientific computing, theoretical fluid dynamics

URL to Lab Website/Profile: https://www.aero.iitb.ac.in/~aniruddha/

Primary nature of research project: Theoretical and moderately computational

# Prof. Viren Menezes



Hiring this season?: **Yes**

Current Research Focus: Shock wave propagation through condensed matter

Skills/experience: Interest in experiments and high-speed flows. Basic knowledge of gas dynamics/compressible fluid mechanics

URL to Website/Profile: https://www.aero.iitb.ac.in/home/people/faculty/prof-v-menezes

Primary nature of research project: Experimental and theoretical.

# Prof. Rajkumar S. Pant

- **Hiring this season: No.**
- **Research areas: Lighter-than-Air (LTA) Systems, Aircraft Design, Optimization, Air Transportation**
- **Essential background: B.Tech/M.Tech in Aerospace Engineering or Mechanical Engineering.**
- **Specific domain of work (current hiring): Optimum Design of Cargo Airships, Hybrid Unmanned Aerial Systems, LTA Systems for planetary exploration**
- **Nature of work: Design and Analysis, Computational studies using open-source codes.**
- **URL: https://www.aero.iitb.ac.in/~rkpant/**

# Prof. Avijit Chatterjee

Hiring this season?: **No**

Research Areas: CFD, Computational Electromagnetics (CEM), Aircraft Design, Aerodynamics

- **Current Hiring**: Modelling and mitigation of communications/telemetry blackout in hypersonic vehicles
  - Skills required: CFD, high-speed flow, exposure and/or willingness to model electromagnetics/plasma physics, optimization.

URL to Lab Website / Profile: https://www.aero.iitb.ac.in/~avijit

Primary nature of research project: computational, design & analysis

# Dynamics and Control

# Prof. Shashi Ranjan Kumar



Hiring this season?: **Yes**

Research Areas:

- Safety Critical Control Development
- Guidance and Control of Autonomous Vehicles
- Aerial Robotics: UAVs/ Drones, Counter-Drone
- Missile Guidance
- Cooperative Control, Collision and Obstacle Avoidance, and Path Planning
- Nonlinear and Robust Control, Sliding Mode Control

URL to Profile: https://www.aero.iitb.ac.in/~shashi

Primary nature of research project: Theoretical/Computer Simulations

Useful skills/experience: Control theory and ordinary differential equations

# Prof. Arnab Maity



Hiring this season?: **Yes**

Research Areas:

- Guidance, Navigation and Control of Aerospace Vehicles
- Drones/Anti-Drones: Swarm Intelligence, Vision Aided Landing, Sense and Avoid, UAV Traffic Management, Geofencing, Drone Corridor
- Optimal and Adaptive Control
- Control and Estimation of Distributed and Cyber Physical Systems
- Fault Tolerant Control and Estimation, Fault Detection and Diagnosis

URL to Lab Website/ Profile: https://www.aero.iitb.ac.in/home/people/faculty/arnab

Primary nature of research project: Theoretical / Simulation / Experimental

# Rohit Gupta

- Hiring this season? **Yes**
- **Research Areas:**
  1. Dynamical systems
  2. Geometric mechanics
  3. Geometric control theory and applications
  4. Optimal control theory and applications
  5. Optimization theory and applications
- **Primary nature of work:** Theoretical

# Prof. Rohit V. Nanavati



Hiring this season?: **Yes**

Research Areas:

- Active Inference Methods for Environmental Mapping
- Intelligent Informative Path Planning
- Sensor Modelling and Management
- Multi-agent Coordination and Mission Planning
- Guidance Design for Aerospace Vehicles

URL to Profile: https://www.aero.iitb.ac.in/home/people/faculty/r.nanavati

Primary nature of research project: Combination of Theory and Experimental Work

Useful skills/experience: Basic knowledge of Control and Probability Theory

# Prof. Deepak Prakash Kumar



Hiring this season?: **Yes**

Research Areas:

- Multi-agent collaboration for search and rescue with reinforcement learning.
- Planning for fixed-wing UAVs, quadcopters, and hypersonic vehicles moving in 2D, over the Earth, and/or 3D.
- Decision making for a fleet of ground and aerial agents to accomplish the given mission optimally.

URL to Profile: https://www.aero.iitb.ac.in/home/people/faculty/deepakpk

Primary nature of research project: Combination of Theory, Simulation, and Experimental Work

Useful skills/experience: Basic knowledge of controls, linear algebra, and some hands-on experience with robots, along with some coding experience in MATLAB/Python

# Propulsion

# Kowsik Bodi

Hiring this session? Yes

Projects available in:

1. Numerical Simulation of heat transfer and plasma effects in EM Railguns
2. Numerical Simulation of spacecraft propulsion plasmas

Primary nature of research project: numerical simulations, code development

URL to Lab website/profile: https://www.aero.iitb.ac.in/~kbodi/

Useful Skills/Experience: Numerical Methods, Programming experience (C++/fortran/python), Fluid Dynamics, Electrodynamics

# Hrishikesh Gadgil

Hiring this session? **Yes**

Projects available in:

1. Spray interactions in multi-injector configuration of rocket combustors
2. Secondary atomization of non-Newtonian liquids like viscoelastic liquids, nano-fluids

Primary nature of research project: Experimental and analytical, computational

Useful Skills/Experience: Experimental methods, flow diagnostics, fluid mechanics

# Krishnendu Sinha



Hiring this session? **Yes**

Projects available in:

1. High-enthalpy flows
2. Shock-turbulence interaction
3. Heat transfer
4. Scramjet application

URL to Lab website/profile:
https://www.aero.iitb.ac.in/~krish/

Primary nature of research project: Computational and analytical

Useful Skills/Experience: Code development, CFD simulation

# Sudarshan Kumar



Hiring this session → YES

Project available

1. Flame speed measurement at high pressure and temperature conditions
2. Flameless combustion and its applications to gas turbines
3. Endothermic fuel development
4. Flame instabilities in micro-channels

Primary nature of work: Largely experimental and partly computational

Useful Skills/Experience: Experimental methods, flow diagnostics, Kinetic modeling, Image processing, Combustion modeling

URL: www.aero.iitb.ac.in/~sudar  *Google Scholar*

# Nagendra Kumar

Hiring this session → **Yes**

Research Topics available:

1. Nitrous oxide based Hybrid Rocket
2. Artificial ageing of solid propellants
3. Energetic Gun Propellants for higher muzzle velocity of artillery gun
4. Laser ignition of solid, liquid and gaseous fuels/mixture
5. Waste to Energy - Use of Bagasse

Primary nature of work: Experimental and computational
Useful Skills/Experience: Experimental methods, use of computational tools (Ansys-Fluent etc.), data analysis.

URL: Webpage; Google Scholar

# A M Pradeep

Hiring this session → **Yes**

Projects available:

1. Effect of surface irregularities on axial compressor performance
2. Aerodynamics of tandem + contra-rotating compressors

Primary nature of work: Experimental and Computational

Useful Skills/Experience: Familiarity with experimental techniques, data analysis and interpretation, Use of computational tools such as Ansys-CFX or Numeca

URL: https://www.aero.iitb.ac.in/~ampradeep/

# T. Chandra Sekar

Hiring this session →

Projects available:

1. Aeroelasticity in compressors.
2. Configuration design and performance prediction of next generation propulsion systems
3. Development of performance prediction models for aircraft and rocket propulsion systems
4. Design of transonic test section for wind tunnel or cascade tunnel.

Primary nature of work: Experimental and Analytical

Useful Skills/Experience: Familiarity with experimental techniques, data analysis. Knowledge on computational tools (Ansys-Fluent/CFX) is desirable.

URL: https://www.aero.iitb.ac.in/home/people/faculty/tchandra

# Structures

# Prof. Chandra Sekher Yerramalli

Hiring this season?: **YES**

Research Areas : Life and fatigue analysis, 3D composites for ballistics/crash, environmental damage analysis of composites

Google Scholar Link : https://scholar.google.co.in/citations?user=36hicnUAAAAJ&hl=en

URL to Lab Website / Profile: https://iitb.irins.org/profile/59571

Primary nature of research project: Modeling and Experimentation

Preferred Background : MTech with focus on Structures from either Civil or Aerospace or Mechanical. Background in Fiber composites and solid mechanics.

# Prof. Abhijit Gogulapati

Hiring this season?: **YES**

Research Areas :

A. Computational aeroelasticity (and related topics)
B. Application of AI and ML for forecasting

Primary nature of research projects: Numerical modeling and simulations; development of computational frameworks.

Potential topics of research: Several, depending on student interest, background, and capabilities.

Preferred Background : Competence in programming and algorithms. Interest in numerical optimization strategies. Willingness to learn multiple disciplines.

# Prof. Krishnendu Haldar

Hiring this season?: **NO**

Research Areas : Modeling active and multifunctional materials, continuum mechanics, multiphysics coupling, computational mechanics

Primary nature of research project: Physics-based material modeling, computational mechanics, experiments. Please visit my webpage (https://sites.google.com/view/krishnendu-haldar)

Potential topic of research: Will be discussed based on your interview performance.

Preferred Background : Good math and physics knowledge. Coding skill will be a plus.

# Prof. Ganesh U. Patil



- Hiring this season? **Yes**
- **Research Areas:**
  - Wave propagation; Wave-material interactions
  - Metamaterials; Phononic Crystals; Architected Materials
  - Ultrasonic Nondestructive Evaluation; Sensing & Perception
- **Nature of Research:** Computational | Experimental | Data-driven
- **Useful Skills/Experiences**: Background/interest in solid mechanics and vibrations is needed. Candidates with prior experience in FE modeling, exposure to continuum mechanics, and ability to code in Matlab and Python will be given preference.
- **Group Website**: https://sites.google.com/view/patilrg