Anshul Jain

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Objective

Driven and hardworking professional with a strong foundation in Engineering Mathematics, Physics, and System Design. As a Graduate Aerospace Engineer and passionate educator, I am eager to take on new challenges that allow me to utilize my skills in strategic planning, training and development, relationship building, and project management. Proven ability to lead cross-functional teams, mentor peers, and simplify complex technical concepts into accessible lessons and hands-on demonstrations. Committed to showing up as my authentic self, following my passions, and adding meaningful value to every role I undertake. Seeking teaching opportunities where I can use my background and expertise to inspire curiosity, analytical thinking, and a lifelong love for learning in students.

Education

- **University of Colorado, Boulder**, Master's in Aerospace Engineering Sciences — *USA — Aug 2023 – Dec 2025*
- **R. V. College of Engineering, Bengaluru**, Bachelor's in Aerospace Engineering — *India — Aug 2019 – May 2023*

Core Competencies

- **Mathematics:** Calculus, Linear Algebra, Matrix Algebra, Eigenvalue Analysis, Differential Equations, State-Space Modeling, System Identification, Curve Fitting, Transfer Function Analysis, Optimization, LQR and Feedback Design, Probability, Statistics, Gaussian Transformations, and Numerical Simulation.
- **Physics:** Rigid-Body Dynamics, Rotational and Translational Motion, Fluid Mechanics, Aerodynamics, Control Systems, Frequency & Time Domain Methods (Bode, Nyquist, Stability Margins), and System Stability Analysis.
- **Instructional Skills:** Curriculum Planning, Lesson Preparation, Classroom Facilitation, Student Guidance, Academic Support, and Educational Communication.
- **Technical Tools:** MATLAB, Simulink, Python, C, C++, JavaScript, R, VS Code, Git, GitHub, Canvas.

Teaching Experience

- **Teaching Assistant** — Aug 2023 – Oct 2025
  University of Colorado Boulder — *Boulder, CO*
  - Taught undergraduate laboratories including **EBIO 1110: Biology and Society**, and **EBIO 1230/1240: General Biology**, guiding 50+ students through experiments that connected theoretical and real-world biological and mathematical principles.
  - Developed and implemented lesson plans, lab manuals, and problem sets that simplified complex concepts into intuitive, hands-on learning experiences.
  - Trained students on lab safety procedures and proper operation of biological laboratory equipment, ensuring a safe and productive environment.
  - Communicated regularly with students and faculty to coordinate testing accommodations, address course-related concerns, and resolve academic or logistical issues.
  - Maintained and updated course Canvas pages, announcements, and discussion boards to build a strong virtual learning presence and improve student engagement.
  - Monitored student performance and participation through grade tracking and feedback systems, identifying learners needing additional support or guidance.
  - Gathered student feedback through mid-semester check-ins and end-of-term evaluations to assess teaching effectiveness and improve course delivery.
  - Collaborated with faculty and departmental staff to enhance instructional quality, ensure accessibility compliance, and promote a positive learning culture.
- **Mentor, Recovery Subsystem Engineer** — Oct 2019 – Aug 2022
  Team Antariksh, R. V. College of Engineering — *Bengaluru, India*
  - Mentored junior team members in the principles of **aerodynamics, fluid mechanics, and system modeling** by connecting theory with real-world rocketry applications.
  - Guided students through the design and analysis of **dual-parachute recovery systems**, explaining concepts such as drag force, lift generation, pressure distribution, and momentum transfer.
  - Led workshops demonstrating how parameters like parachute diameter, mass, and air density affect terminal velocity and stability during descent.
  - Supervised CFD and experimental tests to validate theoretical results, helping students interpret data and refine their understanding of physical principles.
  - Developed visual explanations and calculation templates to enhance comprehension of recovery dynamics and stability criteria.
  - Derived analytical relationships between drag coefficient and Reynolds number to assess performance under varying flow regimes.
  - Documented design iterations, test results, and analytical findings in technical reports to support subsystem validation and team knowledge retention.
  - Encouraged teamwork and scientific reasoning by fostering a collaborative environment focused on applying physics to practical engineering problems.

Projects

- **Spacecraft Attitude Control System [Link]** Jan 2025 – May 2025
  University of Colorado Boulder *Boulder, CO*
  - Analyzed spacecraft mockup frequency-response data to derive mathematical models representing rotational dynamics through curve fitting, transfer-function formulation, and Bode/Nyquist interpretation.
  - Translated frequency-domain characteristics into state-space representation to study system stability, controllability, and observability using matrix algebra.
  - Designed and optimized feedback and observer controllers via pole placement and LQR principles, quantifying system behavior through eigenvalue analysis, damping ratios, and bandwidth metrics.
  - Simulated time-domain responses under step and sinusoidal inputs to illustrate control trade-offs between response speed, actuator saturation, and dynamic stability.
- **Linear Control Design – Multirotor Dynamics [Link]** Aug 2024 – Dec 2024
  University of Colorado Boulder *Boulder, CO*
  - Modeled a six-state symmetric quadrotor system in MATLAB, deriving state-space matrices A, B, C from small-angle linearized translational and rotational dynamics.
  - Evaluated controllability and observability via Gramian integration and rank tests, confirming full control and measurement observability under the chosen model.
  - Applied pole-placement to design state-feedback gains for desired closed-loop eigenvalues, then compared with LQR design minimizing a quadratic cost on states and control effort.
  - Formulated and compared multiple Luenberger observers (slow, equal, fast) by placing observer poles via transpose-based technique and interpreting convergence trade-offs.
  - Simulated closed-loop system (controller & observer) under zero and nonzero initial conditions, analyzing state estimation error dynamics, transient response, and energy cost of actuation.
- **Cooperative Air–Ground Robot Localization Using Kalman Filters [Link]** Aug 2024 – Dec 2024
  University of Colorado Boulder *Boulder, CO*
  - Developed and compared centralized and decentralized localization frameworks using Linear Kalman Filter, Extended Kalman Filter, and Unscented Kalman Filter for multi-robot systems sharing range and position measurements.
  - Linearized nonlinear kinematics and measurement equations to derive Jacobian matrices and prediction/update steps, propagating covariance in the face of system and sensor noise.
  - Implemented filter tuning, cross-correlation management, and covariance consistency checks across multiple filter types to evaluate estimation accuracy and robustness.
  - Simulated ground and aerial vehicle trajectories and assessed performance under communication constraints, measurement delays, and sensor noise via Monte Carlo experiments.
- **Mathematical Image Modeling [Link]** May 2022 – June 2022
  R. V. College of Engineering *Bengaluru, India*
  - Developed mathematical models in MATLAB to animate images by transforming pixel brightness distributions using Gaussian functions.
  - Applied concepts of probability, normalization, and curve fitting to analyze the effect of mean and variance on image intensity patterns.
  - Explored correlations between spatial frequency content and visual perception to interpret image transformations mathematically.
  - Collaborated with peers to evaluate numerical results and optimize model parameters for smoother intensity transitions.

Research Experience

- **Co-Author, 73rd International Astronautical Congress [Link]** Nov 2021 – Sept 2022
  Team Antariksh *Bengaluru, India*
  - Vageesha S, Darpan B, Trisha A, Anshul Jain, Greeshma A, Rithwik R, "Study of Drag Characteristics of a Parachute for landing on planets and moons with different atmospheric conditions and its optimization using gases with varying properties".

Awards and Recognition

- **SAARTHAKA Trust Scholarship** Jan 2020
  R. V. College of Engineering *Bengaluru, India*
  - Awarded for securing **Rank 1 in Aerospace Engineering (2019)** among all first-year students.
- **E-Summit Business Marathon – 1st Place** July 2022
  R. V. College of Engineering *Bengaluru, India*
  - Ranked **1st out of 32 teams** for developing a service-based transport solution addressing damaged road infrastructure in hilly regions during monsoon conditions.

Volunteer Experience

- **Emcee – Faculty Development Program (FDP)** May 2022
  R. V. College of Engineering *Bengaluru, India*
  - Coordinated a 5-day FDP on Machine Learning applications in Aerospace Engineering, facilitating sessions, managing logistics, and ensuring smooth communication between faculty and participants.
- **Emcee – RSS Vishwa Sangh Shibir** Dec 2015
  Rashtriya Swayamsevak Sangh *Indore, India*
  - Served as the Tamil-language Emcee for the international conference, engaging with delegates from 45+ countries after rapidly acquiring conversational proficiency in the language.

Languages

- English: Professional Proficiency
- Hindi: Native Proficiency