

KULVIR JAYDEEP CHAVDA

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EDUCATION

Carnegie Mellon University, Robotics Institute

Master of Science in Robotics

Pittsburgh, PA

Expected Graduation: August 2028

University of Illinois at Urbana-Champaign

Bachelor of Science in Aerospace Engineering (Minor: Computer Science)

James Scholar Honors & Highest Honors; GPA: 3.83/4.00

Champaign, IL

Graduation: May 2026

Parkland College Institute of Aviation

FAA-Approved Private Pilot Certification, Institute of Aviation (Part 141 Program)

Savoy, IL

Graduation: May 2026

RESEARCH EXPERIENCE

Nonlinear Autonomous Control, Exploration, Intelligence, and Systems (N-ACXIS) Lab, UIUC

Urbana, IL

Undergraduate Researcher – GNC, Autonomous/Embedded Systems, & Test Design

November 2024 - March 2026

Supervisor: Dr. Hiroyasu Tsukamoto

- Develop a **physical & simulation-based experiment** to validate 3D Guidance, GNC algorithms, integrated with machine learning, for swarms of heterogeneous UAVs navigating unmapped, **GPS-denied** environments.
- Implement ROS2/Python based autonomy integrating **SLAM**, multi-agent coordination, and robust obstacle avoidance on **3+ UAVs & ground-based robots**.
- Utilize the **Qualisys** Motion Capture System & On-board SLAM in robots at the UIUC drone research lab.
- Simulate and optimize nonlinear flight dynamics using **LQR, PID**, and other control techniques in Python.
- Design and execute full experimental cycle from control law modeling to log analysis and performance evaluation.
- Prepare **technical presentations** to keep Dr. Tsukamoto updated on progress and further plans.

Department of Aerospace Engineering at UIUC, Independent Research

Urbana, IL

Undergraduate Researcher & First Author – Numerical Methods & Data Analysis

May 2023 - May 2024

Supervisor: Heather Arnett (Dr. Joshua L. Rovey as a secondary advisor)

- Utilized **24 flight tests**, thrust tests, & Python to write an algorithm that simulates (< 4% error) model rocket trajectories.
- Conducted **25+ solid rocket-motor thrust tests** to create accurate thrust curves to plug into python algorithms.
- Designed the algorithm structure and developed a Python application with a **GUI** to take user input and output graphs depicting altitude vs. time and drag force vs. time for the model rocket, both with/without drag.
- Gained approval from the university to submit an abstract to the **2024 AIAA Region III Conference**, and got accepted.
- Wrote a paper and polished it over 6 months with advice from Heather Arnett (STEM Advisor) and faculty.
- Prepared detailed schematics and visuals for my conference presentation and delivered a **30-minute talk** on the same.

PUBLICATIONS & PRESENTATIONS

Publications: Chavda, K. J., Arnett, H. R. (2024). Using the Drag Equation and Euler's Method in Python to Predict Model Rocket Flight Trajectories. AIAA Region III Student Conference 2024, Akron, OH. **3rd Place Winner**, Paper ID: AIAA 2024-84150. [DOI: 10.2514/6.2024-84150](https://doi.org/10.2514/6.2024-84150)

Conference Presentations, Posters, and Internal Discussions: As an undergraduate researcher, I have presented technical findings at regional conferences, student competitions, and within university labs, gaining experience in oral delivery, Q&A sessions with faculty, and communicating research to **both technical and general audiences**.

TEACHING & MENTORSHIP

Department of Aerospace Engineering at the University of Illinois

Urbana, IL

Aerospace Educational Development and Outreach Mentor

April 2023 - May 2024

- Selected from a pool of over 20 undergraduate students who applied to work under the Aerospace engineering department's **NDEP (National Defense Education Program) DoD grant**.
- Mentored **20+ STEM teachers & 50+ students** on the fundamentals of rocket science through hands-on workshops using **150+ rockets**, custom avionics, and an intricately planned series of lectures.
- Guided students in building and analyzing rocket systems, forming a well-informed hypothesis, planning test flights, collecting flight data, and deriving design-performance insights.
- Identified and implemented course improvements through detailed surveys that improved course structure & effectiveness to expand the program into more Illinois classrooms.

WORK & PROJECT EXPERIENCE

Stratos Aircraft, Inc.

Redmond, OR

Aerospace Engineering Intern – Flight Controls & Structural Systems

May 2025 - August 2025

- Assisted with **mechanical design, drafting, and manufacturing** of flight control systems, landing gear, and other critical onboard subsystems.
- Collaborated with technicians to align designs with shop capabilities, streamline fabrication, and reduce iteration cycles.
- Drafted and revised **100+ engineering parts and assembly drawings** adhering to FAA/internal engineering standards.
- Integrated feedback from structural engineering reviews by making FEA and test/simulation-based design changes.
- Took full ownership of **4-6 mechanical design, DFM, or drafting projects per week**; communicated progress and questions in weekly team meetings with senior engineers and leadership.

Adani Defense & Aerospace

Ahmedabad, India

Aerospace Engineering Research & Development Intern

June 2024 - August 2024

- Conducted foundational research & design to give proof-of-concept to a novel counter-drone short-range missile system
- Generated **50+ detailed system and design requirements** to support a full concept-to-prototype development cycle.
- Conceptualized **3 engineering design variants**, with CAD, for within **2 weeks** to kickstart project development.
- Designed vehicle trajectory and modelled it using Python to **build appropriate control systems** for the vehicle.
- Modeled and optimized propulsive/aerodynamic forces; conducted **3 trade studies** on structural integrity under loading.
- Led weekly PFMEA sessions to identify design risks and reduced estimated manufacturing time by **up to 50%**.
- Authored a **40-page engineering report** presenting modeling, design analysis, trade-offs, and development roadmap.

Minorities in Aerospace (MAero UIUC), University of Illinois

Urbana, IL

Head of Technical Projects – Leadership

January 2023 - May 2026

- Plan, advise, and recruit engineering students for any technical initiatives undertaken by MAero.
- Lead **3 technical project teams**: High-altitude sounding rocket, Sustainable student-built airplane, and a Fully 3D-printed modular autonomous drone.
- Coordinate and oversee system requirements, budgeting, prototyping, and timeline planning across multidisciplinary teams of **over 20 students**.
- Secured **\$2,500+** in funding from Blue Origin and organized aerospace research events enabling students to directly connect with UIUC faculty.

Department of Defense S.T.E.M. Vertically Landed Rocket Challenge

Bloomington, IL

Project Systems Engineer – Systems Optimization & Prototyping

August 2023 - November 2023

- Volunteered and assembled a team of 6 engineering students, over a month, to represent UIUC at the competition.
- Built & optimized a dual-servo system enabling a solid-fueled rocket to land after being dropped from a height of **30m**.
- Programmed & tuned avionics to control burn timing/orientation and collect inertial/altimetric data across **5 test flights**.
- Utilized simulation and test data to refine system parameters and improve stability margins by **40%** across tests.

HONORS & AWARDS

- **Highest Undergraduate Honors**, University of Illinois at Urbana-Champaign – Awarded to graduating students with a GPA of 3.8 or higher who have also demonstrated outstanding achievement in academic and/or professional activities beyond the classroom.
- **Stu Moment Aviation Citizenship Scholarship Fund**, University of Illinois Urbana-Champaign, 2025-26 – Merit Scholarship for UIUC Students concurrently enrolled in Parkland Institute of Aviation Coursework.
- **AIAA Region III Student Conference 2024** – 3rd Place Winner, Undergraduate Category
- **Dean's List**, Grainger College of Engineering (Fall 2024) – Junior-year 1st semester; GPA: 4.00
- **James Scholar Honors**, University of Illinois at Urbana-Champaign – Inducted in 2024

LANGUAGES & SKILLS

Languages: Native in Gujarati & Hindi, Proficient in English.

Programming & Software: Python, C/C++, MATLAB, Simulink, ROS2, Webots, Linux/Unix, Java, Arduino, Web Dev.

Robotics & Controls: SLAM and state estimation, multi-robot coordination, LQR/PID/robust control, autonomy stack integration, motion-capture (Qualisys), log analysis.

Aerospace & Simulation: FreeFlyer (Orbital Mechanics), OpenRocket, BurnSim, CFD & FEA fundamentals.

CAD & Fabrication: SolidWorks, Siemens NX, Fusion 360, CATIA, 3D printing, prototyping.

Electronics & Avionics: Eagle EDA, Proteus V8, soldering, wiring harnesses, avionics integration.

Data & Visualization: Applied Machine Learning, Data Structures, Data Visualization, linear algebra & numerical methods.