Dhairya Mehta

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PROFILE

Aerospace engineering student with **GNC** experience developing **autonomy algorithms**, **embedded software**, and **building simulation tools** for optimal controls, robotics, drones, and orbit propagation. Skilled in **design for manufacturability**, and modeling in **SolidWorks** & **NX**. Background in **component fabrication, engineering change requests**, and **Document Control**.

EDUCATION

University of Illinois at Urbana-Champaign *Graduation: August 2026*

BS/MS in Aerospace Engineering: Controls and Dynamical Systems

Courses: Flight Dynamics | Autonomous Systems | Robotics | Optimal Aerospace Systems | Spacecraft Attitude and Control | Orbital Mechanics

EXPERIENCE

Auto-Valve, Inc. - *Mechanical Design Engineering* May 2024 – August 2025

- Designed a vent box model and prototype cable-actuated ball valves for RFPs to incorporate ease of assembly and cost-effective fabrication to achieve an 85% reduction in engineering expenses, resulting in the successful design of 2 new top-level prints (and machine jobs)
- Conducted Acceptance and Quality Test Procedures (ATP/QTP) with the engineering team on 8 production valves to verify flight-readiness, operational reliability, and compliance with customer-driven REACH standards and associated MIL, ASTM, and SAE specifications
- Performed torque analysis and thermal testing on a motorized ball valve to verify actuator sizing and ensure reliable operation under design load conditions. Successfully validated valve operation across full operational temperature range (-40° to 55° C) for electric motor sizing
- Processed over 20 Engineering Change Requests (ECRs) for design revisions, specification updates, and conversion of hand-sketched engineering drawings into fully parametric SolidWorks models within PDM covering castings, sheet metal, and machined parts

LIRA Research Group - *Reinforcement Learning* January 2025 – May 2025

- Simulate quadcopter dynamics and control systems using multi-agent environments in Isaac Lab/Sim to test reinforcement learning policies
- Collaborated with team members using Git for version control while developing Python simulation scripts to enhance software reliability

L.E.A.D.S. Research Group - *Sustainable Aviation* November 2023 – January 2026

- Collaborate with a small interdisciplinary team to conduct trade studies on alternative energy carriers, including biofuels, performing analyses to quantify impacts on aircraft performance, fuel consumption, and overall emissions to produce data-driven recommendations
- Validated commercial aircraft performance and turnaround timelines using Monte Carlo–based sensitivity and uncertainty analyses

PROJECTS

Automated Pick-and-Place Robotic Arm

- Programmed a 6-joint arm using ROS to autonomously identify and orient randomly placed groups of blocks using blob detection (OpenCV)
- Implemented forward and inverse kinematics to calculate precise arm movements and end-effector position for block manipulation (±2 mm)

Quadcopter Observer and Controller Design

- Linearized the nonlinear dynamics using LQR controller and motion capture sensors to achieve an overall state estimation RMSE of 0.174
- Successfully streamed live video and captured pictures in flight by integrating an onboard camera (320 × 320 p @ 60 fps grayscale video)

Exploring Optimality of Bi-Elliptic Orbit Transfers

- Formulated bi-elliptic transfers as a nonlinear ΔV optimization problem deriving solutions via KKT and second-order optimality conditions
- Demonstrated numerically using 3D manifolds that bi-elliptic transfers outperform Hohmann transfers for final to initial radius ratios > 11.94

Simulating Effects of Solar Radiation Pressure on Satellite Geometry

- Analyzed satellite attitude dynamics by evaluating solar radiation pressure on panels and their resulting torque effects on stability and control
- Simulated long-term orbital variations to predict effects on satellite altitude and control performance, relevant to Parker Solar Probe stability

Aircraft Combustor Emissions Modeling for Alternative Fuels

- Modeled the combustor of a CFM56-7 series engine using a chemical reactor network to evaluate performance under varying conditions
- Utilized Cantera to simulate chemical kinetics, temperature profiles, and species formations within primary and secondary zone models

LEADERSHIP & TEACHING

University of Illinois - *Teaching Assistant* September 2023 – Present

- Assist students with Siemens NX software, guiding them in 3D modeling, technical drafting, and translating hand sketches into digital design
- Develop grading rubrics, design homework assignments, create tutorial materials for CAD workflows, and host office hours to support

Chai-Town - *Music Director* August 2022 - Present

- Lead a 10-15 member South Asian Fusion Acapella Group, organizing national shows and promoting cultural awareness through music
- Arrange, produce, and record songs for music videos and streaming platforms, integrating South Asian and Western musical elements

PUBLICATIONS & AWARDS

Neil Y. Chen Memorial Best Student Paper Award – AIAA (2025) "The Impact Of Alternative Fuels on US Domestic Aviation Emissions"
AIAA SciTech Forum – AIAA (2026) "Challenges of Retrofitting Existing Aircraft With Next-Generation Powertrains"

SKILLS

Robotics and Controls: GNC | Python | C | LabVIEW | Nonlinear & Dynamic Programming | Hardware Testing | ROS | Ubuntu
Design Engineering: Siemens NX | SolidWorks | Fusion 360 | ECM | GD&T | 3D Print Optimization | Woodshop | Laser Cutting
Systems Engineering: Requirements | Verification | Validation | Sys. Architecture Design | Microsoft Office | Free Flyer | Sizing