Dhruv Jain

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EDUCATION

Purdue University, West Lafayette, IN, USA

- **Master of Science** in Aeronautical & Astronautical Engineering — Expected May 2023
  Focus: Astrodynamics & Space Applications, and Controls — GPA: 4.00
  Advisor: Dr. Kathleen Howell, Multi-Body Dynamics Research Group
  Thesis: Fuel-efficient transfer design between Periodic Orbits using a Quasi-Periodic Orbit in the Circular Restricted Three Body Problem

- **Bachelor of Science** in Aeronautical & Astronautical Engineering, Minor in Astronomy — Dec 2020
  Focus: Dynamics & Controls, and Design — GPA: 3.97

AWARDS and HONORS

- Warner G. Koener Scholarship, School of Aeronautics & Astronautics, Purdue University 2019-2020
- JM Umbreit Scholarship, School of Aeronautics & Astronautics, Purdue University 2020-2021
- Semester Honors and Dean's list for all semesters, Purdue University Aug 2017-Dec 2020
- BSAAE Graduation with Highest Distinction, School of Aeronautics & Astronautics, Purdue University 2020
- American Institute of Aeronautics and Astronautics Student Member Aug 2017 – Present
- SIGMA GAMMA TAU - National Aerospace Engineering Honors Society Aug 2018 – Present

RESEARCH EXPERIENCE

Multibody-Dynamics Research Group, Prof. Kathleen Howell, Purdue University Jan 2021 - Present
Graduate Researcher

- Leveraged numerical methods schemes such as multiple shooter targeting, numerical continuation and complex step differentiation to compute 100+ periodic orbit families and quasi-periodic orbits in the Circular Restricted Three Body Problem
- Exploited Manifolds, Poincare Maps and K-d tree to compute fuel-efficient transfer trajectories between periodic orbits using manifolds of quasi-periodic orbits
- Programmed in Python using numpy and plotly to visualize 3D orbits and trajectories, and their characteristics
- Contribute part of my research code to the popular open-source software - Poliastro

Senior Spacecraft Design Project, Prof. James Garrison, Purdue University Aug 2020 – Dec 2020
Systems Engineer

- Collaborated with 8 peers to develop a satellite constellation with Signals of Opportunity Payload to collect the soil moisture data, and to develop on the success of NASA Soil Moisture Active Passive mission by modifying the mission's science traceability matrix
- Formulated Top Level Requirements, carried out coverage and revisit calculations of satellite constellation with various P, I and L band receiver satellites
- Identified margins, risks, development approach and flight software requirements
- Interfaced and assisted all the team members to realize most aspects of satellite constellation design ranging from mission operations and communication to structure and propulsion

Space Object Taxonomy, Prof. Carolin Frueh, Purdue University May 2018 – Feb 2020
Undergraduate Research Assistant

- Created functions in MATLAB and Python to analyze orbital elements and longitudinal drift of GEO space objects using their Two Line Element data
- Analyzed a large data set of 700+ satellites to develop flexible parameters to automatically sort a space object with 93% accuracy into one of the 8 groups as defined in ESA Classification of Geosynchronous Objects Report

Aerodynamic Deorbit Experiment, Prof. David Spencer, Purdue University Jan 2019 – May 2019
Undergraduate Research Assistant

- Orbit Modeled and ran Monte-Carlo Analysis 10,000+ cases in FreeFlyer by interfacing with MATLAB to find CubeSat lifetime and Ground station contact time for variable right ascension of ascending node, epoch, coefficient of drag and solar radiation pressure area.
- Developed a function in C to interface flight software with IMU in LINUX environment using Buildroot and Raspberry Pi

Spacecraft Docking and Simulation, Prof. James Goppert, Purdue University Aug 2019 – Dec 2019
Undergraduate Research Assistant

- Performed literature review on spacecraft docking and rendezvous algorithms
- Developed a program in Python to compute fuel optimal trajectory for a Chaser spacecraft to intercept with a Target spacecraft

Zero-gravity Flight Experiment, Purdue University Aug 2018 – Dec 2018
Purdue Vibrational Instrumental Payload for Educational Research Team Member

- Collaborated in a team of 6 to make a CubeSat to determine the vibrations in payload section of Blue Origins New Shephard suborbital flight
- Coded extensively using Arduino IDE to extract acceleration data from ADIS16228 & IMU6050 over SPI and I2C respectively

PROFESSIONAL EXPERIENCE

Dhruva Space, Hyderabad, India Jun 2020 – Aug 2020
Spacecraft Dynamics and Control Systems Intern

- Built an attitude dynamics simulator for CubeSat(vehicle) from scratch in Python by using OOP principles
- Simulated Passive Magnetic Attitude Controller by coding Earth's Magnetic Field, Hysteresis Rod Torque, Permanent Magnet Torque, Gravity Gradient Torque and B Dot law controller
- Interfaced with another intern to oversee the implementation of sensor models and Unscented KF algorithm

Dhruva Space, Hyderabad, India May 2019 – Aug 2019
Astrodynamics Intern

- Developed an algorithm in Python to calculate the temporal resolution of Earth observation and communication satellite constellation
- Used SaVi for visualization and to design communication and Earth observation satellite constellation for specific spatial resolution.
- Created animations in Python to simulate the ground track of satellite constellations

Indian Institute of Technology, Delhi, India Jul 2018 – Aug 2018

Undergraduate Intern in Vibrations and Instrumentation Laboratory, Prof. S.P. Singh

- Programmed Arduino using MATLAB and interfaced with ArduinoIDE to control a stepper motor & a USB camera
- Developed programs in MATLAB for color and shape identification in real time moving environment

TEACHING EXPERIENCE:

ENGR 162: Honors Design II, Purdue University Jan 2023 – May 2023

Teaching Assistant

- Tracked class participation and attendance
- Conduced office hours to help students with projects and homework
- Assist with operational logistics of various class activities and porjects

ENTR 500: Technology Realization Seminar, Purdue University Aug 2022 – Dec 2022

Teaching Assistant

- Assisted course instructors in conducting weekly lectures for 85 students
- Tracked class participation and attendance
- Graded thought papers and provided constructive feedback

Minority Engineering Program, Purdue University June 2022 – Aug 2022

Summer Fellow, Co-Instructor

- Co-instructed a summer course for 40 students of 6-8th grade and a course for 20 students of 12th grade from underrepresented minority groups
- Exposed the 6-8th grade students to the concepts of programming and robotics using Scratch programming language and Lego Mindstorms NXT robotics kit
- Challenged the 12th grade students to teach the concepts of programming, engineering and robotics using Hummingbird Kit
- Designed the summer course for 12th grade students from scratch

ENGR 103: Introduction to Engineering In Practice, Purdue University Aug 2021 – Dec 2021

Teaching Assistant

- Assisted course instructors in conducting lectures focused on different research pathways at Purdue and how to apply for them for 51 students
- Provided individualized support to students to find and apply for specific research opportunities
- Graded and gave meaningful feedback on assignments focused on preparing resume, cover letter and speaker reflections

AAE 203 and AAE 352, Course Grader, Purdue University Aug 2019 – Aug 2020

- Graded weekly Homework and Exams to assist the instructors in smooth implementation of course
- Provided helpful feedback to students on their work

MENTORING EXPERIENCE:

Engineering Undergraduate Research Office (EURO), Purdue University Jan 2021 – May 2022
Graduate Assistant (GA)

- Mentored undergraduate students on how to find and apply for research opportunities
- Analyzed and reported undergraduate student research enrollment data for College of Engineering leadership
- Facilitated in planning the logistics of Summer Undergraduate Research Fellowship (SURF) 2021 and 2022
- Planned and conducted multiple outreach events about different research opportunities at Purdue and the role of EURO
- Mentored 23 SURF 2021 students for 10 weeks on how to become more adept at research
- Planned and carried out multiple virtual Professional Development Seminars
- Organized Purdue SURF 2021 Symposium with 8 other EURO Staff for 156 SURF Fellows

Engineering Mentoring Corp, Purdue University Aug 2020 – Dec 2020
Mentor for First-Year Engineering Student

- Assisted first-year engineering students to ease into college life during the peak of Covid-19
- Guided new college students on different resources at Purdue and how to perform well in college

PROFESSIONAL SERVICE

Global Engineering Programs and Partnerships, Purdue University June 2022 – Aug 2022
Graduate Student Volunteer

- Assisted 40 visiting undergraduate students from National Cheng Kung University to adjust to the US culture and shared my experience of being a student at Purdue
- Helped 6 visiting international undergraduate students that are part of the Sister2Sister summer exchange program to overcome the cultural shock and to be successful in Purdue SURF 2022 program

Purdue Undergraduate Research Conference, Purdue University April 2022
Volunteer Oral Presentation and Poster Judge

- Judged and provided feedback to undergraduate students on Research Oral Presentations and Posters

Fall Undergraduate Research EXPO, Purdue University October 2021
Volunteer Judge

- Judged and provided feedback to undergraduate students on their Research Talks

AAESAC Club, Purdue University Jan 2020 – Dec 2020
Career Committee Member

- Organized Aerospace Career Expo Spring 2020

Purdue Space Day, Purdue University Sept 2018 – Oct 2018
Solar Sail Team Space Day Volunteer

- Assisted Purdue Space Day team to plan the logistics of Space Day
- Conducted fun activities to teach the concept of solar sail to 7th graders

Panelist

Organization	Date	Topic
AAE admitted student's panel (virtual), Purdue University	02/11/2022	Graduate school experience, graduate school funding sources, life at Purdue and in West Lafayette
Graduate showcase Panel: Applying to Graduate School as an International Student (virtual), Purdue University	10/3/2021	Life as an international student at Purdue, cultural shock, resources for international student and why I choose Purdue
Straight from Horse's mouth (virtual), Jain International Trade Organisation, India	07/7/2021	Following Jain religion in USA, suggestions on college application process, different funding opportunities, life as an international student in USA, cultural shock
American International School of Budapest (virtual), Hungary	03/04/2021	Keynote speaker for a seminar on opportunities in Aerospace and Astronomy

CONFERENCE PRESENTATION:

- Ravikumar, R., Egor, A., **Jain, D.**, Penamakuru, K., Nekanti, S., Balakumar, V. "Lunar Far Side Tracking and Communication Relay System." Interplanetary Small Satellite Conference, Virutal, May 2020.