Karan Jain

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Education

Ph.D. in Mechanical Engineering August 2018 – Present
University of California, Berkeley, USA *Advisor: Prof. Mark W. Mueller*
- Graduate student researcher at the High Performance Robotics Laboratory
- Majoring in **Controls** with minors in **Robotics** and **Optimization**

B.Tech. with Honors in Mechanical Engineering July 2014 – May 2018
Indian Institute of Technology Bombay, Mumbai, India
- **Ranked 1**st in a class of 153 students
- Minor in System and Controls Engineering with a GPA of 9.80/10.00

Relevant Coursework: Stochastic Systems: Estimation and Control, Computer Vision, Convex Optimization and Approximation, Hybrid Systems and Intelligent Control, Introduction to Machine Learning, Advanced Robotics, Nonlinear Systems and Control, Model Predictive Control

Professional Experience

Embedded systems and GNC Intern at **Zipline** May 2021 - August 2021
Worked on sensor characterization and analyzing thrust-torque margins for delivery drones

Modelling and Simulation Intern at **ideaForge, India** May 2018 - June 2018
Modelled a single-axis gimbal and designed a control mechanism for stabilizing a drone camera

R&D Intern at **Sysmex Corporation, Japan** May 2017 - July 2017
Developed image processing algorithms and contributed to the mechanical design of a Compact Immunoassay Device to detect levels of different hormones using $\sim$100 µL blood samples

Publications

QUaRTM: A Quadcopter with Unactuated Rotor Tilting Mechanism Capable of Faster, More Agile, and More Efficient Flight [PDF, Video]
Jerry Tang, *Karan P. Jain*, Mark W. Mueller
Accepted for publication in Frontiers in Robotics and AI

Docking two multirotors in midair using relative vision measurements [arXiv, Video]
Karan P. Jain, Minos Park, Mark W. Mueller

Tethered Power for a Series of Quadcopters: Analysis and Applications [arXiv, Video]
Karan P. Jain, Prasanth Kotaru, Massimiliano de Sa, Koushil Sreenath, Mark W. Mueller

Staging energy sources to extend flight time of a multirotor UAV [pdf, Publisher, Video]
Karan P. Jain, Jerry Tang, Koushil Sreenath, Mark W. Mueller
Published in International Conference on Intelligent Robots and Systems (**IROS**) 2020

Flying batteries: In-flight battery switching to increase multirotor flight time [pdf, Publisher, Video]
Karan P. Jain, Mark W. Mueller
Published in International Conference on Robotics and Automation (**ICRA**) 2020

Modeling of aerodynamic disturbances for proximity flight of multirotors [pdf, Publisher]
Karan P. Jain, Trey Fortmuller, Jaeseung Byun, Simo A. Mäkiharju, Mark W. Mueller
Published in International Conference on Unmanned Aircraft Systems (**ICUAS**) 2019

Software Skills

Programming Languages	: C++, Python, MATLAB
Robot Operating System (ROS), Embedded Code, PX4	
Computer Aided Design (CAD)	: SolidWorks
Content Creation	: Adobe Illustrator, Adobe Premiere Pro

Product Development Experience

Design and Fabrication of an Electric Vehicle for Formula Student August 2015 – May 2017
Student Team Project, IIT Bombay Racing *Advisor: Prof. Ramesh K. Singh*

- Involved in the design, analysis, manufacturing and testing of the vehicle's powertrain
- Designed a compact, high-efficiency gearbox with a 38% YOY weight reduction

Design and Prototyping of an Exoskeleton suit for Flight July 2017 – July 2018
B.Tech. Project, IIT Bombay *Advisor: Prof. Arindrajit Chowdhury*

- Involved in the development of an all-electric, compact, quiet single-passenger flying device
- Characterized the RPM-power-thrust response of contra-rotating propellers
- Designed a space-frame chassis to house the components and a passenger upto 90 kg in weight

Academic Achievements and Awards

- **Chang-Lin Tien Graduate Fellowship**, Mechanical Engineering, UC Berkeley Spring 2022
- **Graduate Division Block Grant Award**, UC Berkeley Summer 2019, Summer 2020, Summer 2022
- **Institute Technical Citation**, IIT Bombay April 2018
- **All India Rank 35** in the Joint Entrance Exam - Advanced 2014 among 1.4 million candidates

Teaching Experience

Student Staff Assistant for the DEWA-UCB Program August 2020 – October 2022
Course: State Estimation, Autonomy, Machine Learning, and Energy Systems

Undergraduate Teaching Assistant at IIT Bombay for 5 courses:

Calculus	Autumn 2015-16	Basics of Electromagnetism	Spring 2015-16
Differential Equations	Spring 2016-17	Biology	Autumn 2017-18
Numerical Analysis	Spring 2017-18		

- Organized weekly tutorial sessions for about 50 students on different topics pertaining to the course
- Assisted the instructors in comprehensive and timely evaluation of the students

Language Skills

- Fluent in English and Hindi
- Completed elementary level Chinese course at UC Berkeley (80 hours)
- Underwent basic Japanese language training (30 hours)