

Kai Matsuka

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EDUCATION

- California Institute of Technology**, Pasadena, CA Expected June 2022
Ph.D. Student in Aerospace Engineering
Advisor: Soon-Jo Chung
- California Institute of Technology**, Pasadena, CA September 2017 - June 2018
Master of Science in Aerospace Engineering
- University of California Los Angeles**, Los Angeles, CA September 2012 - June 2016
Bachelor of Science in Aerospace Engineering

WORK EXPERIENCE

- NASA Jet Propulsion Laboratory, Pasadena CA** October 2016 - July 2017
Guidance and Control Engineer
- Developed control algorithms for high precision, long-duration formation flying spacecraft for Earth science missions.
 - Developed analytical tools to quantify the fundamental trade-offs for sensor uncertainty, control precision and fuel consumption of spacecraft formation keeping.
 - Implemented and tested control algorithm on flat-floor spacecraft simulation testbed.
- NASA Jet Propulsion Laboratory, Pasadena CA** July 2016 - October 2016
Guidance and Control Intern
- Implemented high-fidelity environment models such as spherical harmonic gravity, solid Earth tide, pole tide, and atmospheric density models for 6DOF simulation of Earth-orbiting satellites in Matlab/SIMULINK.
 - Supported operations of air-bearing satellite formation control testbed
- Orbital ATK, Defence Electronic Systems, Northridge CA** March 2015 - September 2015
GNC and Flight Science Intern
- Helped develop a 6DOF simulation model for Multi-Stage Supersonic Target project (Matlab/SIMULINK).
 - Studied sensitivity of models, verified model implementations, and helped debug the extended Kalman Filter.
 - Implemented Monte Carlo simulations and used it to analyze flight failure footprints.
 - Tested GNC hardware and algorithm on a ground vehicle and analyzed the test data.

PROJECTS

- UCLA Rocket Project** October 2012 - June 2016
Senior Advisor (formerly Project Lead)
- Led a group of students to build a hybrid engine rocket (Nitrous oxide + HTPB/Paraffin) for a competition. The rocket launched and recovered successfully for the first in 6 years of the club's history.
 - Designed and built a test hardware for hybrid engine static tests and successfully obtained thrust measurements.

Laboratory of Biomedical Materials and Devices

June 2014 - August 2014

Undergraduate Researcher

- Used Abaqus to simulate a non-linear deformation of stents due to crimping, deployment, and cyclic loading.
- Developed a material model to capture the behavior of superelastic NiTi alloy.

UCLA ELFIN CubeSat

January 2013 - September 2013

Thermal / Power Subsystem Member

- Created a Matlab-based transient thermal simulation model for 100+ nodes on the ELFIN cube-satellite.
- Conducted a trade study for solar cell types, packing configuration, power generation and costs.

JOURNAL PAPER

Matsuka, K., Scharf, D., Filipe, N., Seubert, C., & Bayard, D. (2019). "Relative Sensing, Control Precision, and Mission Delta-V Trade-Offs for Precision Formation Flying in Planetary Orbit." *Journal of Guidance, Control, and Dynamics*, 1-15.

CONFERENCE PAPER

Matsuka, K., Foust, R., Lupu, E.S., Nakka, V., Chung, S.J. (2019) "Distributed Vision-Based Multi-Target Pose Estimation for Cooperative Spacecraft Swarms." *Proc. 10th International Workshop on Satellite Constellations and Formation Flying (IWSCFF)*, Glasgow, United Kingdom, July 16-19, 2019. **Best Student Paper Award.**

HONORS AND AWARDS

Graduate Affiliate, *Keck Institute of Space Studies*, 2018

National Science Foundation Graduate Research Fellowship Program, 2017-2022

Engineering Achievement Award for Student Welfare, *UCLA Samueli School of Engineering*, 2016
Awarded to students who made outstanding contributions to the campus community through extracurricular activities and service.

Northrop Grumman Scholarship, *UCLA Samueli School of Engineering* 2014, 2015, and 2016
Awarded to outstanding students in engineering.

Boeing Scholarship, *UCLA MAE Department*, 2015

Awarded to two outstanding students in the UCLA Mechanical and Aerospace Department.

Joint Research Institute Scholarship, *Joint Research Institute*, 2014

Awarded to selected participants of the PKU-UCLA Summer Research Abroad program.

Tau Beta Pi Member, 2013

LEADERSHIP AND COMMUNITY SERVICE

GALCIT Graduate Student Council, *California Institute of Technology*, 2018-Present

Committee Member, *Caltech Y Social Activism Speaker Series*, 2018-Present

RISE Tutor, *Caltech Y Rise Tutoring Program*, October 2017-Present

Innovation Maker Space Council, *UCLA Samueli School of Engineering*, March 2016 - June 2016

External Vice President, *AIAA at UCLA*, May 2015 - June 2016

Internal Vice President, *AIAA at UCLA*, May 2013 - May 2015