Samantha Hoang

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Education

Ph.D. in Mechanical Engineering, University of Washington (UW), Seattle, WA 2017–2022

Faculty Advisor: Dr. I.Y. (Steve) Shen

Thesis: Effects of Modeling Choices on High-Performance, Multi-Rotor Drone Dynamics and Energy Efficiency

M.S. in Mechanical Engineering, UW, Seattle, WA 2017–2020

B.S. in Engineering, Harvey Mudd College (HMC), Claremont, CA 2013–2017

Faculty Advisor: Dr. Ziyad Duron

Teaching Experience

Assistant Professor, Seattle University, Seattle, WA 2022–

Pre-Doctoral Instructor, UW, Seattle, WA 2020–2022

Duties: • Develop lectures and extra materials to aid learning, organize and delegate duties to teaching assistants • Hold office hours for students • Create exams and homework assignments • Adapt course materials for online learning due to COVID19.

Courses:

- Kinematics and Dynamics (Winter 2020 & Summer 2020 [online]) (40–150 Students)
- Finite Element Analysis (Summer 2021 [online]) (25 students)

Teaching Assistant, UW, Seattle, WA 2018–2022

Duties: • Lead and develop materials for recitation sections • Grade all assignments and exams • Hold office hours to answer student questions • Adapt course materials for online learning due to COVID19.

Courses:

- *Undergraduate*:
  - Kinematics and Dynamics (Winter 2018, Winter 2021 & Spring 2021 [online]) (130-160 Students)
  - Machine Design Analysis (Spring 2018) (65 students)
  - Introduction to System Dynamics (Winter 2019) (160 Students)
  - Systems Dynamic Analysis and Design (Spring 2019 & 2020 [online]) (160 Students)
- *Graduate*:
  - Dynamics and Vibrations (Fall 2020 & 2021 [online]) (50 Students)

Teaching Assistant and Lab Proctor, HMC, Claremont, CA 2016–2017

Duties: • Assist with example problems in recitation sections • Grade all assignments and exams • Assist in lab experiments and building of model rockets, underwater robots, and sensor circuits

Courses: Experimental Engineering (Spring 2016 & Spring 2017) (80-90 students)

Research Experience

Strategies for Increasing Student Engagement in the Classroom, Doctoral Student Researcher 2021–
Ava Obenaus & Elizabeth Rasmussen, Graduate Students, Mechanical Engineering Department, UW

- Collect data from student evaluations and instructor interviews on the transition from in-person to online learning for ME 230
- Identify changes in student engagement during transition to online learning
- Identify effective teaching strategies for increasing student engagement in both in-person and online settings

Dynamics-Based Study of Multi-Rotor Drones, Doctoral Student Researcher 2018–2022
Dr. I.Y. (Steve) Shen, Mechanical Engineering Department, UW

- Demonstrated that rotor groupings in drones with many rotors is a potential method for reducing energy consumption while provided added benefits such as redundancy
- Demonstrated using PID and PD controllers that it is important to determine the trade-off between energy cost and small margins for trajectory tracking when deciding between different controllers
- Funded for two years by Industrial Technology Research Institute (ITRI), Taiwan
- Completed internship at ITRI Headquarters to collect experimental data on components

Wrinkling in Thin-Films, Doctoral Student Researcher 2017–2018
Dr. Nicholas Boechler, Mechanical Engineering Department, University of California, San Diego

- Developed manufacturing techniques to make PDMS silicone blocks with a thin film adhered to one side
- Conducted experiments to measure the frequency of wrinkles appearing in the film as the block responds to a sudden impulsive force as a way to better understand dynamic wrinkle formation
- Funded US National Science Foundation (Grant No. CMMI-1536406)

Performance-Based Evaluation of Concrete Dams, Undergraduate Student Researcher 2015–2017
Dr. Ziyad Duron, Engineering Department, Harvey Mudd College

- Used cold-gas thruster to exert an impulsive force on concrete dams to measure impulse response of the dam at multiple locations
- Used frequency-domain analysis on impulse responses to locate defects in the dam's structure
- Performed this analysis on Shaver Lake Dam and both testing and analysis on Lower Baker Dam
- Presented work at US Society of Dams Conference and to California's Division of Safety of Dams, Southern California Edison, and US Bureau of Reclamation in Denver, CO
- Funded through the De Pietro Engineering Fellowship

Publications

5. **Hoang, S.** and Shen, I. Y. "Cost of Controls for Multi-Rotor Drones." *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE)* (2021): p.V08BT08A002. `https://doi.org/10.1115/detc2021-67816`.
4. **Hoang, S.**, Marsh, L., Aliseda, A., and Shen, I. Y. "Effects of High Fidelity Modeling of Multirotor Drones." *ASME Journal of Autonomous Vehicles and Systems* Vol. 1, No. 1 (2021): p.011007. `https://doi.org/10.1115/1.4050013`

3. **Hoang, S.**, Marsh, L., Aliseda, A., and Shen, I. Y. "Analysis of High Fidelity Modeling of Drone Dynamics and Aerodynamics for Reduced Energy Consumption." *IDETC-CIE* Vol. 83969 (2020): p.V007T07A022. https://doi.org/10.1115/DETC2020-22481
2. **Hoang, S.**, Liu, Y., Aliseda, A., and Shen, I. Y. "Stability analysis of high-performance drones with suspended payloads." *IDETC-CIE* Vol. 59285 (2019): p.V008T10A039. https://doi.org/10.1115/DETC2019-97947
1. Abi Ghanem, M., Liang, X., Lydon, B., Potocsnak, L., Wehr, T., Ghanem, M., **Hoang, S.**, Cai, S., and Boechler, N. "Wrinkles Riding Waves in Soft Layered Materials." *Advanced Materials Interfaces* Vol. 6, No. 1 (2019): p. 1801609. https://doi.org/10.1002/admi.201801609

Presentations

Invited Talks

Hoang, S. and Shen, I. Y. "Effects of High Fidelity Modeling of Multirotor Drones." *IDETC-CIE* Spotlight Session, Virtual, August 2021.

Conference Talks

Hoang, S. and Shen, I. Y. "Cost of Controls for Multi-rotor Drones." *IDETC-CIE*, Virtual, August 2021.

Hoang, S., Marsh, L., Aliseda, A., and Shen, I. Y. "Analysis of High Fidelity Modeling of Drone Dynamics and Aerodynamics for Reduced Energy Consumption." *IDETC-CIE*, Virtual, August 2020.

Hoang, S., Liu, Y., Aliseda, A., and Shen, I. Y. "Stability analysis of high-performance drones with suspended payloads." *IDETC-CIE*, Anaheim, CA, August 2019.

Intellectual Property

U.S. Patent 10632298, "Fluid infusion systems and methods," Apr 28, 2020. *Link*

Work Experience

Global Internship Program Fellow, Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan 2019

- Performed experiments on drone subsystems to verify simulation results for large multi-rotor drone model

Mentoring

Undergraduates

- **Peter Tsanev** (2020): Developed additional rotor groupings and ran simulations to find the most energy efficient grouping
- **Nolan Shinn** (2020-2021): Created additional trajectories to demonstrated the effects of rotor groupings and controllers on energy consumption

Fellowships & Awards

Outstanding Teaching Assistant Award, UW, Seattle, WA 2020

De Pietro Engineering Fellowship, Harvey Mudd College, Claremont, CA 2016–2017

- Fellowship awarded annually to three undergraduate engineering students to perform research with Dr. Ziyad Duron on dam monitoring and evaluation.

Service

Workshop Facilitator, UW, Seattle, WA 2021
- Teach the basics of LaTeX to graduate students in the Mechanical Engineering department in the context of dissertation and paper writing.

Mechanical Engineering Graduate Student Association Secretary, UW, Seattle, WA 2019–2022
- Organizing meetings and note-taking
- Taking on tasks with no subcommittee such as organizing joint events with undergraduate student organizations and consulting with staff for building renovations.

Graduate Student Mentor, UW, Seattle, WA 2018–2022
- Help new graduate students in the department transition into graduate school smoothly by connecting them to appropriate resources and providing advice.

Discover Days Presenter, UW, Seattle, WA 2018–2019
- Host an exhibit about how vibrations can create different patterns on sand covered plates due to the different vibrational modes.

Science Bus Volunteer, Claremont, CA 2016
- Volunteer with student organization to teach weekly science lessons at a low-income elementary school.

Uncommon Good Mentor, Claremont, CA 2013–2016
- Act as a mentor to elementary school student from a local, underprivileged family who is interested in pursuing a college degree in the future.