PETER GUNNARSON

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EDUCATION

California Institute of Technology, Pasadena, CA — June 2024
Ph.D. in Aeronautics, Graduate Aerospace Laboratories
Dissertation: "Autonomous flow-based navigation in unsteady underwater environments"
Advisor: Prof. John O. Dabiri

California Institute of Technology, Pasadena, CA — June 2020
M.S. in Aeronautics, Graduate Aerospace Laboratories

University of Virginia, Charlottesville, VA — May 2019
B.S. in Aerospace Engineering with Highest Distinction. GPA: 3.99
Minor in Applied Math

HONORS AND AWARDS

6. Hope Street Postdoctoral Fellowship (Brown University) — August 2024
5. Richard Bruce Chapman Memorial Award in Hydrodynamics (Caltech EAS) — June 2024
4. National Science Foundation Graduate Research Fellowship — April 2020
3. Louis T. Rader Chairperson's Award for leadership in aerospace engineering (University of Virginia) — May 2019
2. Outstanding Student in Aerospace Engineering Award (University of Virginia) — May 2019
1. Sigma Gamma Tau Aerospace Honor Society inductee (University of Virginia) — October 2016

PEER-REVIEWED PUBLICATIONS

P. Gunnarson, J. O. Dabiri (*in review*). "Leveraging vortex-rings for energy-efficient propulsion." [arXiv link]

H. Han, X. Ma, W. Deng, J. Zhang, S. Tang, O. S. Pak, L. Zhu, E. Criado-Hidalgo, C. Gong, E. Karshalev, J. Yoo, M. You, A. Liu, C. Wang, H. K. Shen, P. N. Patel, C. L. Hays, **P. Gunnarson**, L. Li, Zhang, J. O. Dabiri, L. V. Wang, M. G. Shapiro, D. Wu, Q. Zhou, J. R. Greer, W. Gao (*accepted*). "Imaging-guided bioresorbable acoustic hydrogel microrobots". ***Science Robotics***.

M. Fernandez, T. Wang, G. Tunnicliffe, D. Dortilus, **P. Gunnarson**, J. O. Dabiri, and D. I. Goldman (*submitted*). "AquaMILR+: Design of an untethered limbless robot for complex aquatic terrain navigation". [arXiv link]

P. Gunnarson, J. O. Dabiri (2024). "Flow-based navigation for tracking underwater plumes in an autonomous robotic swimmer." ***Bioinspiration & Biomimetics*** (19) 056024. [Link]

P. Gunnarson, I. Mandralis, G. Novati, P. Koumoutsakos, and J. O. Dabiri (2021). "Learning efficient navigation in vortical flow fields." ***Nature Communications*** (12) 7143. [Link]

P. Gunnarson, Q. Zhong, and D. B. Quinn (2019). "Comparing Models of Lateral Station-Keeping for Pitching Hydrofoils." ***Biomimetics*** (4) 51. [Link]

RESEARCH EXPERIENCE

Hope Street Postdoctoral Fellow August 2024 - current
Brown University, Providence, RI
Advisor: Prof. Monica Wilhelmus
Project: Robotic metachronal swimmer

Visiting Postdoctoral Scholar August 2024 - current
NASA Jet Propulsion Laboratory, CA
Advisor: Kalind Carpenter
Project: Robotic metachronal swimmer

Graduate Researcher September 2019 - June 2024
California Institute of Technology, Pasadena, CA
Advisor: Prof. John O. Dabiri (Graduate Aerospace Laboratories)
Project: Autonomous flow-based navigation in unsteady underwater environments.

Research Assistant May 2018 - May 2019
University of Virginia, Charlottesville, VA
Advisor: Prof. Dan Quinn (Department of Mechanical and Aerospace Engineering)
Project: Developing control strategies for fish-like robots with flapping airfoil modelling.

Multirotor Drone Design Intern May 2017 - August 2017
The MITRE Corporation, Charlottesville, VA
Project: Successfully designed, built, and tested a folding, fully autonomous 3D printed quadcopter with a camera platform for the U.S. Marine Corps.

TEACHING EXPERIENCE

Teaching Assistant: Fluid Mechanics (Ae 101c) April 2023 - June 2023
California Institute of Technology, Pasadena, CA
Taught by Prof. Paul E. Dimotakis

- Third-quarter graduate fluid mechanics course on viscous flows, vortex dynamics, and boundary-layer theory.
- Responsibilities included weekly recitation and monthly review sessions; preparing, grading, and writing solutions to homework assignments; responding to student questions via email.

Instructor: Fundamentals of 3D Printing for Engineers (MAE 1501) August 2016 – December 2016
University of Virginia, Charlottesville, VA
Advised by Prof. Gavin Garner

- Developed and taught a complete 13-lecture course, including lecture materials, assignments, syllabus, midterm and final projects.
- Topics included limitations and strengths of additive manufacturing, how to use and build several kinds of 3D printers, and how to design parts for 3D printing. Lectures included hands-on experience using, building, and modifying 3D printers.

Instructor: CAD and 3D Printing STEMinar Series May 2016 – November 2016
Nothern Virginia Community College, Annandale, VA

- Developed and taught two day-long STEMinar workshops to introduce college and high school students to computer aided design and 3D printing.

CONFERENCE PROCEEDINGS

9. **P. Gunnarson** and J. O. Dabiri (2024). "Surfing vortex rings for energy-efficient propulsion." 77th Annual Meeting of the APS Division of Fluid Dynamics. Salt Lake City, UT, 24-26 November 2024, C09.00011.
8. **P. Gunnarson** and J. O. Dabiri (2023). "Fish-Inspired Navigation via Flow Sensing in an Autonomous Robotic Swimmer." 76th Annual Meeting of the APS Division of Fluid Dynamics. Washington, DC, 26-28 November 2023, X06.06.
7. **P. Gunnarson** and J. O. Dabiri (2023). "Fish-Inspired Navigation via Flow Sensing in an Autonomous Robotic Swimmer." Aquatic Sciences Meeting. Palma de Mallorca, Spain, 4-9 June 2023. Session SS094A.
6. **P. Gunnarson** and J. O. Dabiri (2022). "Fish-Inspired Navigation via Flow Sensing in an Autonomous Robotic Swimmer." 75th Annual Meeting of the APS Division of Fluid Dynamics. Indianapolis, IN, 20-22 November 2022, G05.04.
5. **P. Gunnarson** and J. O. Dabiri (2022). "Robotic Implementation of Online Deep Reinforcement Learning for Autonomous Underwater Navigation." Ocean Sciences Meeting. Virtual, 28 February – 4 March 2022, Session DS07.
4. **P. Gunnarson**, I. Mandralis, G. Novati, P. Koumoutsakos, and J. O. Dabiri (2021). "Robotic Implementation of Online Deep Reinforcement Learning for Autonomous Underwater Navigation." 74th Annual Meeting of the APS Division of Fluid Dynamics. Phoenix, AZ, 21-23 November 2021, A13.01.
3. **P. Gunnarson**, I. Mandralis, G. Novati, P. Koumoutsakos, and J. O. Dabiri (2021). "Learning Efficient Navigation in Vortical Flow Fields." 14th Southern California Flow Physics Symposium. Virtual, 10 April 2021, C3.02.
2. **P. Gunnarson**, I. Mandralis, G. Novati, P. Koumoutsakos, and J. O. Dabiri (2020). "Deep Reinforcement Learning for Efficient Navigation in Vortical Flow Fields." 73rd Annual Meeting of the APS Division of Fluid Dynamics. Virtual, 22-24 November 2020, R1.18.
1. **P. Gunnarson** and M. Bychkov (2016). "A new teaching style for introductory physics labs." 4th Annual UVA Innovation in Pedagogy Summit. Charlottesville, VA, 3 May 2016.

MENTORING AND OUTREACH

Organizer and Lead TA - Pasadena Police Activities League (PAL) July 2023
California Institute of Technology, Pasadena, CA
Two-week long daily after-school program for schools in Pasadena

- Helped write a proposal to fund a two-week-long robotics summer project.
- Taught 20 middle and high school students to assemble and program 10 Arduino-based robots.

Volunteer - Pasadena Police Activities League (PAL) April 2022 - Present
California Institute of Technology, Pasadena, CA
Subsidized after-school program for local elementary-school students

- Assisted with monthly interactive sessions to teach students about concepts in aerospace engineering.
- Helped organize a lab tour with hands-on activities on the fluid mechanics of swimming animals.

President and Co-Founder of the UVA 3D Printing Club April 2016 – May 2019
University of Virginia, Charlottesville, VA

- Organized and instructed more than ten outreach events at Computers4Kids, the Boys and Girls Club in Charlottesville, and Ladies in the Lab at UVA. Outreach included presentations, demonstrations, and hands-on projects for kids in elementary, middle, and high school, as well as repairing and donating 3D printers.

· Led weekly on-campus meetings to teach UVA students how to use 3D printers, including designing and building custom projects and 3D printers.

Videographer - Graduate Fluid Mechanics Documentary April 2018 - June 2018
University of Virginia, Charlottesville, VA
P. Gunnarson (Videographer), E. Femia (Writer), M. C. Lansing (Editor), W. A. Schaefermeier (Producer).

· Produced a 16-minute documentary to educate a general audience on graduate fluid mechanics research at the University of Virginia. Conducted interviews with professors and graduate students.
· Shown to a public audience on campus and submitted to the Virginia Film Festival. [Link]

PROFESSIONAL SERVICE

GALCIT Colloquium Teaching Assistant August 2022 - June 2023
California Institute of Technology, Pasadena, CA
Co-TA with Nathan Wei for Prof. John O. Dabiri

· Identified, contacted, and scheduled speakers for the weekly GALCIT seminar series.
· Coordinated seminar logistics, including planning the visit schedules for each speaker, arranging meetings, and publicizing seminars.