

Simon R. Anuszczyk

SimonA@caltech.edu

(916) 207-5652

EDUCATION

PhD, Aeronautics	Anticipated Spring 2026
Caltech, Graduate Aerospace Labs	Pasadena, CA
Advisor: John O. Dabiri	
M.S., Aeronautics	June 2022
Caltech, Graduate Aerospace Labs	Pasadena, CA
B.S., Mechanical Engineering	May 2019
B.A., Astrophysics	May 2020
Columbia University, School of Engineering and Applied Science	New York, NY
Study Abroad: Queen Mary University of London	London, UK
Relevant Coursework: Automotive Combustion, Solid Mechanics, Thermodynamics	Jan 2017-Jun 2017

RESEARCH/PROJECT EXPERIENCE

Dabiri Lab	Pasadena, CA
<i>Graduate Research Assistant</i>	April 2022-Present
- Investigate jellyfish muscle stimulation using arduino for biohybrid robotic ocean exploration - Non-invasively measure jellyfish swimming energetics using computer vision and laser scanning - Augment jellyfish to swim 5 times faster than natural jellyfish while carrying a payload larger than themselves - Utilize 3D 3C scanning PIV to study jellyfish wake and calculate hydrodynamic and metabolic efficiency - Characterize 3,600 gal vertical water treadmill for swimming experiments - Study diurnal brine shrimp migration using PIV to find impact of migrating swarms on ocean mixing	
Columbia Rocketry Program	New York, NY
<i>Founder, President, former Chief Engineer</i>	Sept 2016-May 2020
- Manage engineering team of 40 students through design, manufacturing, and testing processes to develop and launch a 11 ft. 64 lb. high powered rocket as only first year hybrid team at the Spaceport America Cup - Led successful development of experimental 400 lb-ft thrust hybrid paraffin/nitrous oxide rocket engine - Managed all aspects of testing, safety, and finance, wrote grants raising more than \$25k	
Experimental Tilt-Wing Aircraft Senior Design Project	New York, NY
<i>Design Lead</i>	Sept 2018-May 2019
- Designed, built, and tested electric vertical take-off and landing aircraft combining the speed and range of airplanes with the flexibility of helicopters for difficult to reach locations and emergency environments - Achieved 5x efficiency in demonstration flights by taking off as a helicopter and transitioning to airplane mode by rotating wings and propellers to achieve higher efficiency than V-22 aircraft	
Robotics and Rehabilitation Lab with Professor Sunil Agrawal	New York, NY
<i>Robotic Spine Exoskeleton Research Assistant</i>	Sept 2017-May 2018
- Modified passive spine brace with dual 6 degree-of-freedom Gough-Stewart platforms for scoliosis patients - Designed and fabricated passive translational actuators with continuously adjustable stiffness and length using Solidworks, Matlab, 3D printers, and CNC machines	
Columbia GAPS Lab with Astrophysics Professor Chuck Haley	New York, NY
<i>Research Assistant on Black Hole and Anti-particle experiments</i>	Jan 2016-Jan 2017
- Analyzed NuSTAR and SWIFT observational data to identify black hole candidates at Galactic Centre - Fixed and characterized vacuum chamber and faulty thermocouples, built/machined misc. lab hardware	
FSAE Racecar Project for International College Competition	New York, NY
<i>Suspension Team Member, Columbia University</i>	Sept 2015-Dec 2017
Suspension design, fabrication, and troubleshooting, powertrain troubleshooting	
<i>Machinist, California State University Sacramento</i>	Sept 2014-Jun 2015
Machine various parts using CNC and manual lathes and mills	

PROFESSIONAL EXPERIENCE

The Boeing Company

Oklahoma City, Oklahoma

Stress Analyst Engineering Intern

June 2019-August 2019

- Conducted Finite Element Modeling analysis of B-1B Lancer Forward Intermediate Fuselage to determine fleet safety using FEM theory and Hypermesh, Nastran, and Catia software
- Investigated B-1B structural fatigue cracking history and conducted damage and durability tolerance analysis

The Boeing Company

Philadelphia, PA

Manufacturing Engineering Intern

July 2018-August 2018

- Automated Autoclave planning by creating tool to prioritize and visualize composite part flow by ranking material expiration, priority, and tool size and solving bin packing problem to minimize wasted space
- Calculated new time standards and methodology for all V-22, H-47, and F-18 composite parts by operation based on historical values and time studies to improve efficiency and drive process improvements

NASA Jet Propulsion Laboratory (JPL)

Pasadena, CA

Mechanical Engineering Intern

Jun 2017-Aug 2017

- Designed and implemented passive vibrational damping circuits for active mirrors with Matlab and LTspice
- Achieved 74% damping by tuning circuits to target amplified modes enabling high contrast telescope imaging
- Characterized clean room vibration isolation using accelerometers and Matlab

Data Science Intern

Jun 2016-Aug 2016

- Built web app to visualize facilities data sets overlaid on CAD floor plans using AutoCAD, Python and Java
- Developed VR framework and procedures and presented to upper management for implementation across JPL

SKILLS

Applications: Matlab, Python, R, Data Science, CFD, FEM, Catia, Hypermesh, SolidWorks, Ansys, LTspice, Arduino, Blender

Machines and Fabrication: 3D Printing, CNC Mills, Lathes, Drill Press, Laser Cutting, Soldering, Power Tools

AWARDS

National Science Foundation Graduate Research Fellowship (2023)

Fulbright U.S. Student Program Semi-finalist (2020)

Ross Fellowship, Purdue (2020, declined)

Dean's Graduate Assistantship, CU Boulder (2020, declined)

Flagship Fellowship, University of Maryland, (2020, declined)

Clark Doctoral Fellow, University of Maryland, (2020, declined)

Hypersonics Graduate Fellowship Fund, Caltech (2021)

Questbridge Scholar (2015-2020)

Dean's List, Columbia University (2015, 2016, 2019)

Dean's Travel Fund, Columbia University (2016, 2018, 2019)

Class of 1945 Scholarship, Columbia University (2015)

PUBLICATIONS AND PRESENTATIONS

1. **Anuszczyk SR**, Dabiri JO (2025) "A non-invasive technique for metabolic rates of free-swimming jellyfish," Society of Integrative and Comparative Biology Annual Meeting, January 2-6, Atlanta, Ga.
2. **Anuszczyk SR**, Dabiri JO (2024) "Propulsive Efficiency of Robotically Controlled Jellyfish for Ocean Exploration," Bulletin of the American Physical Society Division of Fluid Dynamics Meeting, November 24-26, Salt Lake City, UT.
3. **Anuszczyk, SR**, Dabiri, JO (2024). "Electromechanical enhancement of live jellyfish for ocean exploration." *Bioinspiration and Biomimetics*, 19 026018. [\[Link\]](#)
4. **Anuszczyk SR**, Dabiri JO (2024) "Robotically controlled jellyfish: Biomechanics of modified bell shapes," Society of Integrative and Comparative Biology Annual Meeting, January 2-6, Seattle, WA.
5. **Anuszczyk SR**, Dabiri JO (2023) "Robotically controlled jellyfish: Modifying swimming dynamics with mechanical forebodies," Bulletin of the American Physical Society Division of Fluid Dynamics Meeting, November 19-21, Washington, DC.

6. **Anuszczyk SR**, Dabiri JO (2023) "Enhanced swimming and physiological limits of robotically controlled *Aurelia aurita* jellyfish," ASLO Aquatic Sciences Meeting, June 4-9, Palma de Mallorca, Spain.
7. **Anuszczyk SR**, Dabiri JO (2023) "Enhanced swimming and hydrodynamic efficiency of robotically controlled *Aurelia aurita*," Society for Integrative and Comparative Biology Annual Meeting, January 3-7, Austin, TX.
8. **Anuszczyk SR**, Dabiri JO (2022) "Hydrodynamic efficiency of robotically controlled *Aurelia aurita* in a vertical water treadmill," Bulletin of the American Physical Society Division of Fluid Dynamics Meeting, November 20-22, Indianapolis, IN.
9. **Anuszczyk SR**, Hooper H (2022), "Particle Tracking Velocimetry of Phototactic Brine Shrimp Migration," Ae104C course project, Pasadena, California.
10. **Anuszczyk SR**, Flusche, AJ (2019) Boeing B-1 Stress Modeling, Presented computational model to managers and B-1 structures team. Aug 2019, Oklahoma City, Oklahoma.
11. **Anuszczyk SR**, Brunsberg R, Jang H, Pederson J, Zhang L, "A VTOL tilt-wing tilt-rotor electric aircraft for emergency services," Columbia Engineering Senior Design Expo, May 2019.

TEACHING AND COMMUNITY INVOLVEMENT

Teaching Assistant: Biomechanics of Organismal Design	Pasadena, CA
Taught by Professor Michael Dickinson	Spring term 2024
Teaching Assistant: Experimental Methods in Aerospace	Pasadena, CA
Taught by Professor John Dabiri	Fall, Winter, and Spring terms 2024-25
Sustainable Energy Activity Lab Lead	Pasadena, CA
After-school program to help high school students explore science and sustainability	Sept 2023-May 2024
Future Ignited/CAPP mentor	Pasadena, CA
Mentor high-achieving underrepresented undergraduate students through the graduate school app process	
Pasadena Humane Society	Pasadena, CA
Volunteer animal care and assistance with animal adoptions	Jan 2024-Present
GALCIT Graduate Student Council	Pasadena, CA
Organize student events and advocate for graduate students at the department level	Sept 2022-Present
Columbia Space Initiative	New York, NY
<i>Technical Course Instructor</i>	Sept 2016-May 2020
Teach engineering tutorials on CAD, CAM, modeling, rocketry dynamics, machining, and other technical skills	
<i>Aerospace Outreach</i>	Sept 2015-May 2020
- Present at middle and high schools to introduce middle and high school students to basics of aerospace - Demo at Intrepid Museum events including annual Intrepid Kid's Day - Host school groups on campus and talk about our rocketry research	
Mentoring Programs	New York, NY
- Mentor, Columbia Space Initiative mentoring program for underclass students - Mentor, ASME mentoring program for mechanical engineers - Mentor, Questbridge mentoring program for low-income first-generation college students	
Sacramento Youth Commission	Sacramento, CA
Advise Mayor's office on issues related to youth in Sacramento	
Woodland Community College Senator of science and technology	Woodland, CA
Advocate for students and organize events related to STEM	
Woodland Community College Tutoring Center	Woodland, CA
<i>Math and English Tutor</i>	Sept 2011-May 2015
- Tutor remedial math to calculus + all levels of English to community college students - Work extensively with special needs students to increase test scores by utilizing alternative teaching methods	

SELECTED MEDIA AND PRESS COVERAGE

1. Work mentioned in CNN article <https://www.cnn.com/science/australia-cyborg-beetles-cockroaches-hnk-spc/index.html>
2. Interview on BBC, <https://www.bbc.co.uk/programmes/w3ct4tr9>
3. Interview on ABC, <https://www.abc.net.au/listen/programs/sundayextra/robotic-jellyfish/103564136>

4. Article in Popular Science, <http://ct.moreover.com/?a=53302608817&p=1pl&v=1&x=ApZ-3sdUBtVQWSMFYrdsdw>
5. Article in The Engineer, <https://www.theengineer.co.uk/content/news/biohybrid-robotic-jellyfish-to-gather-data-from-deep-sea>
6. Article in Phys.org, <https://phys.org/news/2024-02-bionic-jellyfish-ocean-exploration.html>
7. Article in EurekAlert, <https://www.eurekalert.org/news-releases/1036031>
8. Article in Interesting Engineering, <https://interestingengineering.com/innovation/jellyfish-robot-explore-deep-sea>
9. Article in RealClear Science, https://www.realclearscience.com/2024/03/01/creating_cyborg_jellyfish_to_explore_the_deep_ocean_101531_1.html
10. Article in Pasadena Now, <https://www.pasadenanow.com/main/caltech-scientists-could-turn-natures-drifters-into-high-tech-explorers>
11. Article in Institution of Mechanical Engineers, <https://www.imeche.org/news/news-article/caltech-engineers-create-cyborg-jellyfish-for-deep-water-data-collection>
12. Article in Science Springs, <https://sciencesprings.wordpress.com/2024/02/29/from-the-california-institute-of-technology-building-bionic-jellyfish-for-ocean-exploration/>
13. Article in infobae (Spanish), <https://www.infobae.com/america/agencias/2024/02/29/crean-medusas-bionicas-para-la-exploracion-oceanica/>
14. Article in JAEN (Spanish), <https://www.diariojaen.es/canales/trending/son-medusas-o-robots-oceanicos-ID9702028>
15. Article in Caltech News, <https://www.caltech.edu/about/news/building-bionic-jellyfish-for-ocean-exploration>
16. Podcast Physics World, <https://physicsworld.com/a/bionic-jellyfish-and-more-efficient-windfarms-a-conversation-with-john-dabiri/>
17. Article in New scientist, <https://www.newscientist.com/article/2404025-cyborg-jellyfish-have-a-swimming-cap-and-electric-propulsion-system/>
18. Article in Pasadena Now, <https://www.pasadenanow.com/main/national-science-foundation-selects-50-caltech-students-nine-alumni-for-research-fellowships>
19. Article in Columbia News, <https://urf.columbia.edu/news/37-columbia-students-awarded-2023-nsf-graduate-research-fellowships>

CERTIFICATIONS

AAUS Scientific Diver	Aug 2024-Present
PADI Rescue Diver	Jan 2019-Present
Private Pilot	June 2021-Present
Wilderness First Responder	Nov 2020-Present
CPR	Nov 2020-Present
Amateur (Ham) Radio Technician License	July 2017-Present
National Association of Rocketry Level 1 Rocketeer	Sept 2018-Present

PROFESSIONAL ASSOCIATIONS

American Physical Society
 Society of Integrative and Comparative Biology
 ASLO
 American Institute of Aeronautics and Astronautics
 American Society of Mechanical Engineers
 Society of Automotive Engineers
 National Association of Rocketry

EXTRACURRICULARS

Competitive Ballroom Dance, 1 st place in several international competitions	Jan 2016-May 2020
Columbia Whitewater Kayaking Club	Sept 2018-May 2020

Knickerbocker Motorsports
Competition Team Member, Columbia Ultimate Frisbee Team
Uganda Travel Team Technical Lead, Engineers Without Borders Uganda Project

Sept 2015-May 2019
Sept 2015-Dec 2017
Sept 2015-June 2016