

Sara Oliveira Santos

Professional Experience

Distinguished Postdoctoral Scholar

2024 - Present

The University of Texas at Austin, Institute for Geophysics

Mentor: Krista Soderlund

Education

Ph.D. in Engineering, Graduate Ostrach Fellow

2019 - 2024

Brown University, Providence, RI, USA

(University of California, Riverside from 2019 to 2021)

Advisor: Prof. Monica Martinez Wilhelmus

M.S. in Aerospace Engineering, Presidential Scholar

2017 - 2019

Iowa State University, Ames, IA, USA

Advisors: Prof. Thomas Ward III, Prof. Benjamin Ahn

B.S. in Mechanical Engineering

2014 - 2016

The University of Akron, Akron, OH, USA

Publications

(* = corresponding author, underline = mentored student)

Force generation in a rotating and pitching plate of variable area

S. Oliveira Santos, M. Brown, M. Kim, N. Tack, M.M. Wilhelmus

Under prep for Journal of Fluid Mechanics, manuscript available upon request

Bioremediation of Lunar Regolith Simulant through Mycorrhizal Fungi and Plant Symbioses  (2025)

J. Atkin, T. Gentry, E. Pierson, **S. Oliveira Santos***

Accepted, *Scientific Reports*. Pre-print: *bioRxiv* 2024.01.18.576311

Going around the bend to understand the role of leg coalescence in metachronal swimming  (2025)

N. Tack, **S. Oliveira Santos**, M.M. Wilhelmus

J Exp Biol (2025) 228 (12): *jeb249330*

Ups and downs: Copepods reverse the near-body flow to cruise in the water column  (2024)

N. Tack, **S. Oliveira Santos**, B. Gemmell, M.M. Wilhelmus

Marine Biology, 171(11), 207.

Pleobot: a modular robotic solution for metachronal swimming  (2023)

S. Oliveira Santos, N. Tack, Y. Su, F. Cuenca, O. Morales, P.A. Valdez, M.M. Wilhelmus

Scientific Reports, 13(1), 9574

Why undergraduate students choose and discontinue an Aerospace Engineering degree  (2021)

B. Ciccotosto, U. Tobey, **S. Oliveira Santos**, B. Ahn

International Review of Aerospace Engineering, Vol 14, N. 5, pp 228-239.

Conference Proceedings (underline = mentored student) _____

Oliveira Santos, S., Nezami, A., Spiers., E. , Gunnarson, P. , Soderlund, K. *Designing for the environment: scaling underwater vehicles with ocean processes*, American Geophysical Union Meeting 2025, New Orleans, LA

Oliveira Santos, S., Tack, N., Herrera-Amaya, A. ,Brown, M., Wilhelmus, M.M. *Swimming across scales: shrimp kinematics and hydrodynamics across Reynolds numbers*, 78th meeting of the American Physical Society Division of Fluid Dynamics, Houston, TX.

Mohebbi, N., Tack, N., **Oliveira Santos, S.**...., Wilhelmus, M.M. *How Women Do It All: Rheometry, flow visualization, and computational modeling of breastmilk expression*, 78th meeting of the American Physical Society Division of Fluid Dynamics, Houston, TX.

Daurenova, M., Tack, N., **Oliveira Santos, S.**. *1+1 ≠ 2: mussels can't math*, 2025 Summer Research Symposium, July 30th, Austin, TX.

Oliveira Santos, S., Brown, M., Kim, M., Tack, N., Wilhelmus, M.M. *Exploring the trade-off of lift and thrust during shrimp swimming*, 77th meeting of the American Physical Society Division of Fluid Dynamics, Salt Lake City, UT.

Oliveira Santos, S., Wilhelmus, M.M. *Shrimpin' Ain't Easy: Understanding the shrimp locomotion success*, Ocean Sciences Meeting 2024, New Orleans, LA.

Oliveira Santos, S., Tack, N., Brown, M., Wilhelmus, M.M. *Can hair help you swim faster? Yes, if you ask shrimp!*, 76th meeting of the American Physical Society Division of Fluid Dynamics, Washington, DC.

Brown, M., **Oliveira Santos, S.**, Tack, N., Wilhelmus, M.M. *Analysis of shrimp appendage cupping on swimming performance through a Bio-inspired model*, 76th meeting of the American Physical Society Division of Fluid Dynamics, Washington, DC.

Brown, M., **Oliveira Santos, S.**, Tack, N., Wilhelmus, M.M. *Appendage cupping and hydrodynamics of shrimp-inspired model*, 2023 Summer Research Symposium, August 4th, Providence, RI.

Oliveira Santos, S., Tack, N., Su, Y., Wilhelmus, M.M. *Leakiness at intermediate Reynolds number in metachronal drag-based swimming*, SICB 2023 Annual Conference, Austin, TX

Oliveira Santos, S., Tack, N., Su, Y., Wilhelmus, M.M. *RoboKrill: the role of morphology on thrust production during metachronal swimming*, 75th meeting of the American Physical Society Division of Fluid Dynamics, Indianapolis, IN

Oliveira Santos, S., Valdez, A., Lopez, O., Cuenca-Jimenez, F., Di Santo, V., Wilhelmus, M.M. *Robokrill: pleopod morphology and vortex generation during drag-based metachronal swimming*, 19th U.S. National Congress on Theoretical and Applied Mechanics, Austin, TX

Oliveira Santos, S., Valdez, A., Lopez, O., Cuenca-Jimenez, F., Tack, N., Su, Y., Wilhelmus, M.M. *Robokrill: a new method for understanding metachronal drag-based swimming*, Microscale Ocean Biophysics 2022, Mallorca, Spain

Oliveira Santos, S., Valdez, A., Lopez, O., Cuenca-Jimenez, F., Di Santo, V., Wilhelmus, M.M. *Robokrill: a metachronal drag-based swimmer robot*, Ocean Sciences Meeting 2022, Virtual

Oliveira Santos, S., Valdez, A., Lopez, O., Cuenca-Jimenez, F., Di Santo, V., Wilhelmus, M.M. *Robokrill: understanding vortex generation during drag-based metachronal swimming*, 73rd meeting of the American Physical Society Division of Fluid Dynamics, Virtual

Oliveira Santos, S., Ahn, B., Ward, T. *Flutter derivatives for 1-DOF bridge decks using semi-flexible cantilevers*, 71st meeting of the American Physical Society Division of Fluid Dynamics, Atlanta, GA

Invited lectures

Shrimp as a model organism for bio-inspired underwater vehicles

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| UT Robotics, UT Austin, TX, USA | October, 2025 |
| Fluids Webinar, University of Houston, Houston, TX, USA | May, 2025 |
| University of Texas Institute for Geophysics, UT Austin, TX, USA | April, 2025 |
| Aerospace Engineering, UT Austin, TX, USA | March, 2025 |
| Mechanical Engineering, The Cooper Union, NY, USA | March, 2025 |
| Civil, Architectural and Environmental Engineering, UT Austin, TX, USA | January, 2025 |
| University of Texas Marine Science Institute, Port Aransas, TX, USA | December, 2024 |
| Integrated Bioscience, The University of Akron, Akron, OH, USA | August, 2024 |
| CCOM, University of New Hampshire, Durham, NH, USA | April, 2024 |
| Guest lecture, Bioinspired Robotics, University of Colorado, Boulder, CO, USA | October, 2023 |

How Shrimp Swim

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| Skype-a-Scientist, Online | May, 2025 |
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Towards a unifying theory of metachronal swimming

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| EEOB, Brown University, Providence, RI, USA | March, 2023 |
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Grants

Matagorda Bay Mitigation Trust, PENDING

"Oyster Reef Hydrodynamics from Organism to Matagorda Bay: A multi-scale approach to restoration"
PI: Benjamin Keisling, Co-I: Sara Santos (100%), Total Budget: \$448,182

Terry and Elliott Endowed Fund for Research in the Geosciences, UT Austin, 2025-2026

"Shaped-based navigation: Design of Passive Particle Tracers for Ocean Turbulence"
PI: Sara Santos, Total Budget: \$50,000

University of Texas Institute for Geophysics Innovation Award, 2024

"Design of Passive Particle Tracers for Ocean Turbulence Mapping"
PI: Benjamin Keisling, , Co-I: Sara Santos (100%), Total Budget: \$7,700

Brown University Hazeltine Innovation Award, 2023-2024

"The Fluid Mechanics of Breastfeeding"
PI: M.M. Wilhelmus, Total Budget: \$99,997

Teaching

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| Graduate Teaching Assistant, University of California, Riverside, CA, USA <i>Undergraduate Fluid Mechanics</i> | Winter 2021 |
| Graduate Teaching Assistant, University of California, Riverside, CA, USA <i>Graduate Fluid Mechanics</i> | Winter 2021 |
| Graduate Assistant, NSF-REU, Iowa State University, Ames, IA, USA <i>Launching Aerospace's Underrepresented Students into the Next Chapter- Unmanned Aerial Systems</i> | Summer 2019 |
| Graduate Teaching Assistant, The University of Akron, OH, USA <i>Introduction to Fluid Mechanics</i> | Spring 2017 |
| Graduate Teaching Assistant, The University of Akron, OH, USA <i>Gas Turbine Lab</i> | Spring 2017 |

Mentoring

Graduate students

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| Jessica Atkin | 2022-Present |
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Undergraduate students

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| Melissa Daurenova | 2025 |
| Mageean Brown | 2023-2024 |
| Nondi Walters | 2021-2022 |

General impact

[The Andy Richter Call-In Show \(Jan 30 2025\)](#) ↗, podcast

Animal Stories

[Discover Magazine \(Apr 10 2024\)](#) ↗, in-print September/October 2024 issue
Space Hummus Anyone? Researchers Grow Chickpeas from Simulated Moondust

[New Scientist \(Nov 21 2023\)](#) ↗

Hairy legs make you swim better – if you're a shrimp

[Popular Science \(Jun 30 2023\)](#) ↗

This robotic leg could give machines krill-like swimming abilities

[New Atlas \(Jun 29 2023\)](#) ↗

Scientists copy krill to develop swarms of aquatic robots

[British Broadcasting Corporation \(BBC\) \(Feb 21 2022\)](#) ↗

RoboKrill: The tiny swimming robot inspired by krill

Service

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| University of Texas, Postdoc Research Symposium Committee | 2025 |
| University of Texas Institute for Geophysics, Graduate Award Committee | 2025 - Present |
| Manuscript review, Journal of the Royal Society Interface | 2024 - Present |
| Reviewer, American Society for Gravitational and Space Research | 2024 - Present |

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| Manuscript review, Biomimetics & Bioinspiration | 2024 - Present |
| Manuscript review, Physical Review Fluids | 2023 - Present |
| Volunteer Scientist, Skype a Scientist | 2022 - Present |
| Volunteer Scientist, Sea Shepherd Portugal | 2019 – 2024 |
| Volunteer, Youth Pride Rhode Island | 2023 – 2024 |
| Society of Women Engineers, Iowa State University | 2018 - 2019 |

Fellowships, Honors & Awards

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| Palisades Postdoctoral Fellowship, University of Texas at Austin | ≈ \$200,000 | 2024–2026 |
| Simon Ostrach Graduate Fellowship, Brown University | ≈ \$96,000 | 2023–2024 |
| Charlotte Mangum Support Award, SICB | | 2023 |
| Graduate Travel Award, Brown University | | 2022, 2023 |
| International Travel Fund Award, Brown University | | 2022 |
| American Physical Society Travel Grant | | 2018 |
| Presidential Scholar, Iowa State University | ≈ \$150,000 | 2017–2019 |