

# Sara Oliveira Santos

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## Professional Experience

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### Distinguished Postdoctoral Scholar

2024 - Present

University of Texas at Austin, Institute for Geophysics

## Education

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### 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

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Can hair help you swim faster? Yes, if you ask shrimp!

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

*Under prep, available upon request*

Analysis of Shrimp Appendage Cupping on Swimming Performance through a Bio-inspired Model

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

*Under prep, available upon request*

[Going around the bend to understand the role of leg coalescence in metachronal swimming](#) (2024)

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

*Submitted, Journal of Experimental Biology*. Pre-print: *bioRxiv* 2024.07.24.605009

[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

*Accepted, Marine Biology*. Pre-print: *arXiv* 2404.04413

[From dust to seed: a lunar chickpea story](#) (2024)

J. Atkin, **S. Oliveira Santos**

Pre-print: *bioRxiv* 2024.01.18.576311

[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

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**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!*, 76<sup>th</sup> 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*, 76<sup>th</sup> 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*, 75<sup>th</sup> 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*, 73<sup>rd</sup> 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*, 71<sup>st</sup> meeting of the American Physical Society Division of Fluid Dynamics, Atlanta, GA

## Invited lectures

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### Shrimp as a model organism for bio-inspired underwater vehicles

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

October, 2023

## Towards a unifying theory of metachronal swimming

EEOB, Brown University, Providence, RI

March, 2023

## Grants

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### 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
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Graduate Teaching Assistant, University of California, Riverside, CA, USA <i>Graduate Fluid Mechanics</i>	Winter 2021
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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
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Graduate Teaching Assistant, The University of Akron, OH, USA <i>Introduction to Fluid Mechanics</i>	Spring 2017
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Graduate Teaching Assistant, The University of Akron, OH, USA <i>Gas Turbine Lab</i>	Spring 2017
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## Mentoring

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### Undergraduate students

Mageean Brown	2023-2024
Nondi Walters	2021-2022

### High School students

Casper Bilderback	Summer 2023
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## General impact

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[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

[New Scientist \(Feb 16 2022\)](#) [↗](#)  
Meet RoboKrill the one-legged robot that mimics the way krill swim [Video]

[British Broadcasting Corporation \(BBC\) \(Feb 21 2022\)](#) [↗](#)  
RoboKrill: The tiny swimming robot inspired by krill

## Service

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Reviewer, American Society for Gravitational and Space Research	2024 - Present
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 – Present
Volunteer, Youth Pride Rhode Island	2023 – 2024
Society of Women Engineers, Iowa State University	2018 - 2019
Volunteer Scientist, Proyecto Raices, Akron, OH, USA	2015 - 2017

## Fellowships, Honors & Awards

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Simon Ostrach Graduate Fellowship, Brown University	2023
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	2017-2019
Mechanical Engineering Advisory Council Scholarship, University of Akron	2016
Dr. Paul C. Lam Memorial Scholarship, University of Akron	2016