Ian Ho

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Research Interests

Biological Fluid Mechanics, Physical Computing, Active Matter, Interfacial Phenomena

Education

Stanford University, School of Engineering — **Stanford, CA**
Ph.D. Biological Engineering — *2021-*
Advisor: Manu Prakash

Stanford University, School of Engineering — **Stanford, CA**
M.Sc. Biological Engineering — *2021-2023*

Brown University, School of Engineering — **Providence, RI**
B.Sc. Mechanical Engineering (Honors) — *2017-2021*
Research Advisor: Daniel Harris

Research Experience

Prakash Lab (Stanford University) — **Stanford, CA**
Graduate Research — Advisor: Prof. Manu Prakash — *2022-*

- **Coral Larvae Swimming Behavior**
  - 3D long-term tracking across the larval life cycle quantifies swimming states and transitions that shape dispersal strategies [1].
- **Parasite Interfacial Swimming**
  - Identified and modeled a novel interfacial swimming mode in schistosome larvae that enhances near-surface transport and dispersal [2].
- **Self-learning Mechanical Circuits**
  - Realized unsupervised learning in elastic networks where spring stiffness adapts as the learning degree of freedom, enabling programmable mechanical memory [3].

Harris Lab (Brown University) — **Providence, RI**
Undergraduate Research — Advisor: Prof. Daniel Harris — *2018–2021*

- **Self Propulsion and Collective Interaction of Capillary Surfers**
  - Established a capillary-wave-driven active-matter system of "surfer" particles with tunable self-propulsion and wave-mediated interactions [5,6].
- **Direct Measurement of Capillary Attraction**
  - Developed a magnetic force measurement platform to directly measure capillary attraction between floating cylinders [9].
- **Interfacial Drag on Floating Bodies**
  - Quantified skin-friction drag for centimeter-scale disks sliding on the air–water interface, isolating boundary-layer contributions [10].

Breuer Lab (Brown University) — **Providence, RI**
Independent Study — Advisor: Prof. Kenny Breuer — *2020–2021*

- **Energy Harvesting with Flexible Hydrofoils**
  - Measured how a flexible tip alters heaving–pitching hydrofoil dynamics and boosts energy-harvesting performance [8].

In Preparation

*co-first author

[1] **Ian Ho***, Qing Zhang*, Benjamin Foster, Elora López-Nandam, Rebecca Albright and Manu Prakash. Behavior plasticity in free swimming coral larvae via long term tracking microscopy. **In Preparation**, 2025.

Preprint & Published

[2] Melanie Hannebelle, **Ian Ho** and Manu Prakash. Schistosomiasis parasite enhance transmission rates via interfacial swimming. **Submitted**, 2025. [PDF]

[3] Vishal P. Patil*, **Ian Ho***, and Manu Prakash. Self-learning mechanical circuits. **Submitted**, 2024. [PDF]

[4] **Ian Ho***, Giuseppe Pucci*, Anand U. Oza and Daniel M. Harris. Capillary surfers: wave-driven particles at a fluid interface. **Physical Review Fluids**, 2023. ("Editors' Suggestion" and "Featured in Physics"). [PDF]
APS | FYFD | DFD Gallery of Fluid Motion

[6] Anand U. Oza , Giuseppe Pucci, **Ian Ho**, and Daniel M. Harris. Theoretical modeling of capillary surfer interactions on a vibrating fluid bath. **Physical Review Fluids**, 2023. ("Featured in Physics") [PDF]

[7] **Ian Ho**, Ajay Harishankar Kumar and Daniel M. Harris. Reconfigurable mechanical vibrations laboratory kit. **Journal of Open Hardware**, 2022. [PDF]

[8] Howon Lee*, **Ian Ho*** and Kenneth Breuer. Energy harvesting performance of an oscillating hydrofoil with a flexible tip. **AIAA Scitech**, 2022. [PDF]

[9] **Ian Ho**, Giuseppe Pucci, and Daniel M. Harris. Direct measurement of capillary attraction between floating disks. **Physical Review Letters**, 2019. ("Editors' Suggestion" and "Featured in Physics"). [PDF]
APS | Ars Technica | Physics Buzz | News from Brown | Futurity

[10] Giuseppe Pucci, **Ian Ho**, and Daniel M. Harris. Friction on water sliders. **Scientific Reports**, 2019. [PDF]

Contributed Posters & Presentations

Posters

- **Ian Ho**, Vishal P. Patil, Manu Prakash. *Self-learning mechanical circuits* . Boulder School for Condensed Matter and Materials Physics 2024, Colorado. [Link]
- **Ian Ho**, Vishal P. Patil, Manu Prakash. *Self-learning mechanical circuits* . Aspen Center for Physics Winter Conference: Computing with Physical Systems 2024, Aspen. [Link]

Presentations

- **Ian Ho**, Qing Zhang, Elora López-Nandam, Rebecca Albright, Manu Prakash. *Behavioral plasticity in free-swimming coral larvae via long-term tracking microscopy*. APS March Meeting 2023, Las Vegas. [Bulletin]
- **Ian Ho**, Ajay Harishankar Kumar, Daniel M. Harris. *Skin friction on oscillating interfacial bodies*. APS DFD Meeting 2021, Phoenix. [Bulletin]
- Hongquan Li, *et al.* (incl. **Ian Ho**). *Pufferfish: Developing a rapidly scalable full-feature ventilator for COVID-19 patients with ARDS*. APS DFD Meeting 2020, Virtual. [Bulletin]
- **Ian Ho**, Giuseppe Pucci, Daniel M. Harris. *Direct measurement of capillary attraction between floating disks*. APS March Meeting 2019, Boston, MA. [Bulletin]

Fellowships

Tau Beta Pi Fellowship (Stark No. 42): Among 28 selected, 2021-2022. [Link]

Awards and Honors

Poster award: Stanford Bio-X Interdisciplinary Seed Grants Program Poster Session (25/229), 2023. [Link]

Stanford Bio-X Travel Award: Travel award to attend APS March Meeting, 2023. [Link]

Outstanding Senior Award in Mechanical Engineering: Brown School of Engineering, 2021. [Link]

Sigma Xi Honor Society: Inducted 2021.

Karen T. Romer Undergraduate Teaching and Research Award: Awarded to conduct research at Brown University, 2019.

Tau Beta Pi Engineering Honor Society: Awarded to top 1/8 of Engineering Class, inducted 2019. [Link]

Teaching Experience

Physiology: Modern Cell Biology — Marine Biological Laboratory (MBL) **Woods Hole, MA**
Teaching Assistant [Link] *2025*

BIOE 271 Frugal Science — Stanford University **Stanford, CA**
Teaching Assistant *2023,2024,2025*

ENGN 1735 Vibration of Mechanical Systems — Brown University **Providence, RI**
Teaching Assistant, Course Development [7] *2021*

ENGN 1860 Advanced Fluid Mechanics — Brown University **Providence, RI**
Teaching Assistant *2020*

Summer@Brown "Fluid Mechanics Through Hovercraft Physics" — Brown University **Providence, RI**
Co-instructor *2018*

APMA 340 Ordinary Differential Equations **Providence, RI**
Teaching Assistant *2018*

Field Research

2023: *R/V Atlantic Explorer (Bermuda)* — Tracking microscopy measurements of acantharian sedimentation.

2022: *R/V Sikuliaq (Alaska)* — Measurements of centric diatom buoyancy-regulation behavior.

References

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Vishal P. Patil
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