OCÉANE E. BOULAIS

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EDUCATION

Ph.D. in Oceanography | **Thode Environmental Acoustics Lab**
Discovery-oriented deep learning approaches for underwater ecosystem monitoring 2022 – Present
Scripps Institution of Oceanography, University of California San Diego San Diego, CA

Master of Media Arts and Sciences | ***Computational Innovations for Fisheries*** 2018 – September 2020
Massachusetts Institute of Technology Cambridge, MA

Bachelor of Science | ***Major: Electrical Engineering, Minor: Computer Science*** 2013 – May 2018
Florida Atlantic University, Cum Laude Boca Raton, FL

EXPERIENCE

Graduate Student Researcher 2022 - Present
Scripps Institution of Oceanography, *Thode Environmental Acoustics Lab* San Diego, CA

- Co-led an acoustic enrichment field experiment (Summers 2022-25, Kāne'ohe Bay, O'ahu) with Dr. Aaron Thode to attract herbivorous juvenile reef fish and suppress algal growth; deployed and analyzing data from burst-mode autonomous cameras, a seafloor vector-sensor recorder, and mono-channel hydrophones.
- Developing a contrastive learning–enabled predictive autoencoder to detect and classify migrating bowhead whale call types and estimate spatial distributions; employing unsupervised clustering on latent feature vectors to identify distinct call classes, with applications to other complex vocalizers (gray and humpback whales, walrus, other pinnipeds, and select terrestrial species).
- Managing a team of lab interns (highscoolers, undergraduates and Masters students), meeting twice a week to lead the development of stereovision-enabled autonomous cameras; developing a novel fish larvae detector leveraging physics-based particle tracking velocimetry.

Software Product Manager July 2021 – July 2022
Oceanit Laboratories Honolulu, HI

- Supported a team of researchers and data scientists in the software development of a portfolio of research projects: an automated in-situ root analysis system for crop growth optimization, local ecosystem monitoring for offshore aquaculture fish farms, lesion formation detection on retina surfaces and the temporal tracking of invasive pig species in state-protected forest zones.

Machine Learning Research Engineer November 2020 – December 2021
Northern Gulf Institute/National Oceanic and Atmospheric Administration Starkville, MS

- Led curation of the first large-scale Gulf of Mexico reef-fish image dataset and coauthored a workshop paper at the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 8th Fine-Grained Visual Categorization workshop (FGVC8), in collaboration with the National Oceanic and Atmospheric Administration's Southeast Fisheries Science Center (NOAA SEFSC); applied few-shot learning and clustering to classify rare species and assess similarity-based grouping.
- Managed a team of developers to deploy semi-supervised learning algorithms for automated species identification and length estimation of reef fish in the Gulf of Mexico.

Research Intern May 2020 – August 2020
NASA and SETI Frontier Development Lab Mountain View, CA

- Performed data wrangling and evaluation metric development for a base layer model in the development of a novel physics-based generative-adversarial neural network that predicted coastal flooding utilizing satellite imagery of the US East Coast. Demo at *trillium.tech/eie/*

Graduate Student Researcher September 2018 – September 2020
Massachusetts Institute of Technology Media Lab, *Responsive Environments Group* Cambridge, MA

- Trained a multi-object tracking and classification model that stored accuracy probabilities on safety objects to efficiently perform scene assessment of video data from the main deck on industrial tuna fishing fleet vessels to enhance at-sea fisher safety.

Hardware Engineering Intern Summer 2017
Meta Menlo Park, CA

- Supported the characterization and testing of equipment reliability of key data center server components and scripted experiments for polling, logging and parsing data from each testing cycle.

Skills

Languages: English and French (Native), Spanish (B1)
Certificates: AAUS Scientific Diver, PADI Advanced Open Water Diver, Certified Paragliding Pilot (Stage 3), GCP Associate Cloud Engineer, Renewable and Sustainable Energy Technology (2015)
Programming: Python, Figma, HTML/CSS, Tensorflow, LaTeX, C, C++, MATLAB, SQL, JavaScript
Hardware: Eagle, AutoCAD, Inventor, SolidWorks, Verilog (FPGA), Roland GS-24, Arduino
Relevant Coursework: Underwater Bioacoustics (Scripps), Modeling and Applied Machine Learning (MIT)
Shop Tooling: 3D printing, Waterjet, Laser Cutter (Epsilon)

Selected Publications

Generating Physically-Consistent Satellite Imagery for Climate Visualizations 2024
B. Lütjens, B. Leshchinskiy, **Boulais, O.***, F. Chishtie*, N. Díaz-Rodríguez*, M. Masson-Forsythe*, A. Mata-Payerro*, C. Requena-Mesa*, A. Sankaranarayanan*, A. Piña, Y. Gal, C. Raïssi, A. Lavin, D. Newman; *equal contribution
IEEE Transactions on Geoscience and Remote Sensing, 62:4213311. DOI: 10.1109/TGRS.2024.3493763

Acoustic enrichment in Hawai'i using autonomous cameras for reef fish larval detection 2024
Boulais, O., Schar, D.,Levy, J., Kim, K., Levy, N., Reichert, J., Schiettekatte, N., Wangpraseurt, D., Madin, J., Thode, A.
Proceedings of Meetings on Acoustics, DOI: 10.1121/2.0001870

FathomNet: An underwater image training database for ocean exploration and discovery 2021
Katija, K., Schlining, B., Lundsten, L., Barnard, K., **Boulais, O.**, Woodward, B., Bell, K. C.,
Marine Technology Society, DOI:10.4031/MTSJ.55.3.20

SEAMAPD21: a large-scale reef fish dataset for fine-grained categorization 2021
Boulais, O., Alaba, S. Y., Yu, J., Iftekhar, A. T., Zheng, A., Prior, J., Moorhead, R., Ball, J., Primrose, J., Wallace, F.
Proceedings of FGVC8: The Eighth Workshop on Fine-Grained Visual Categorization (CVPR 2021)

Physics-informed GANs for Coastal Flood Visualization 2020
Lütjens B., Leshchinskiy B., Requena-Mesa C., Chishtie F.,
Díaz-Rodriguez N., **Boulais, O.**, Piña A., Newman D., Lavin A., Gal Y., Raïssi C.
IEEE Transactions on Neural Networks and Learning Systems

Interpolating GANs to Scaffold Autotelic Creativity 2020
Epstein, Z., **Boulais, O.**, Gordon, S., Groh, M.
Joint Proceedings of the ICCC 2020 Workshops

Honors and Fellowships

Regents Fellowship 2022
Merit-based fellowship for graduate students at Scripps Institution of Oceanography at University of California, San Diego

Conservation International/Northrop Grumman Fellowship 2019
Merit based grant for the research of AI-enabled fisheries management in the Pacific Islands

Ocean Exploration Fellow, MIT Open Ocean Initiative/National Geographic 2019
Merit based grant to co-deploy drop cameras in the Galapagos for benthic mapping

Elements Fellowship, MIT Media Lab 2018
Merit based scholarship to support thesis research and conference travel

IEEE Power and Energy Society Plus Initiative & Schweitzer Meritorious Scholar 2014 - 2016
Nation-wide and reoccurring merit based scholarship given to the highest GPA-scoring engineering students

Teaching

Teaching Assistant Marine ArcGIS (SIOB 296) 2024 Winter
Scripps Institution of Oceanography, University of California San Diego La Jolla, CA, USA

Mentor, Scripps Institution of Oceanography Applicant Support Knowledgebase Fall 2023-Present
A mentorship program for prospective SIO graduate students from underrepresented backgrounds La Jolla, CA

Teaching Assistant Blockchain Ethics (MAS 201) Fall 2018-19
Massachusetts Institute of Technology Cambridge, MA

Afterschool Code for America Teacher, STEAM Engineering Fall 2015 - Fall 2016
Held weekly creative coding workshops for middleschoolers in underrepresented regions meant to engage students without typical access to computers; held soldering workshops for Arduino-enabled electronic design. Broward County, FL

Conferences and Presentations

Field demonstration of enhanced coral larval settlement using acoustic enrichment, mesoscale artificial structures, and engineered biofilms (Press Conference Presentation and Conference Talk) May 2025
188th Meeting of the Acoustical Society of America, New Orleans, USA

Applied Acoustic Enrichment of Hawai'i Reefs (Poster) December 2024
Acoustical Society of America, Sydney, Australia

Computer Vision for Fishermen Safety(Conference Talk) January 2023
The Pew Charitable Trust Global AI in Fisheries Summit, Atlanta, USA

SETI/NASA Earth Intelligence Engine (Presentation) August 2020
Frontier Development Lab (Remote) tinyurl.com/fdlpresentation

Ganimals: The Underwater Sea Creatures of Our Computational Dreams February 2020
Ocean Sciences Meeting, Imagining Ocean Science: Education and Outreach ganimals.media.mit.edu

Stone to Sea July 2019
11th International Conference on Computer Vision, Computer Vision Art Gallery stonetosea.github.io

Integrating Art with STEM Education March 2015
TEDxBoca Raton, USA https://tinyurl.com/tedxoceane

Peer Review Contribution

- The Journal of the Acoustical Society of America — Reviewer (January 2025)
- Environmental Science Journal — Reviewer (October-December 2024)
- JASA Express Letters — Reviewer (June-July 2024)
- NOAA Small Business Innovation Research (SBIR) — Grant Reviewer (June-August 2021)