

BLAKE IAN BARRY COLE

Mechanical (Marine/Aeronautical) Engineer

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EDUCATION

Massachusetts Institute of Technology

2024

Ph.D. in Mechanical Engineering

Cambridge, MA

- **Thesis Title:** *Wingsail design methodology and performance evaluation metrics for autonomous sailing*
- **Course Focus:** Design Optimization, Autonomy, Control, Aerodynamics
- **Advisors:** Peter Traykovski, Henrik Schmidt
- **GPA:** 4.8/5.0

Stanford University

2015

M.S. in Civil & Environmental Engineering

Stanford, CA

- **Course Focus:** Hydrodynamics, Numerical Methods, Product Design
- **Advisor:** Stephen Monismith
- **GPA:** 3.74/4.0

University of California, San Diego

2013

B.S. in Environmental Engineering

La Jolla, CA

- **Major:** Environmental Engineering
- **Minor:** Political Science
- **GPA:** 3.45/4.0

SOFTWARE PROFICIENCIES

Programming Languages

Python, C/C++, MATLAB, LabVIEW, LaTeX

Python Packages

PyTorch, Numpy, Pandas, Scipy, Matplotlib,
BeautifulSoup, HTMLParser, Jupyter, GPkit, GPfit

CAD

Solidworks, NX, Fusion360, Orca3D, CorelDRAW

Fluid Dynamics

STAR-CCM+, COMSOL Multiphysics, Fluent

Autonomy

MOOS-IvP, ArduPilot, ROS

HARDWARE PROTOTYPING SKILLS

Machine Shop Skills

lathe, mill, router, band saw, table saw, miter saw,
laser cutter, water-jet cutter, planer, jointer, thermoformer

Composite Manufacturing

plug and mold design, carbon fiber layup, resin tint,
vacuum bag lamination, epoxy filler fairing

Additive Manufacturing

Markforged Mark2, Stratasys Objet350 Connex2,
Bambu Lab X1-Carbon, Formlabs Form 3L

Microcontrollers

Arduino, ESP32, PixHawk, Teensy, myDAQ, myRIO

Sensors & Actuators

DC motors & servos, linear actuators, GNSS-RTK,
AHRS, ultrasonic anemometers, angular encoders,
Hall effect sensors, load cells, proximity sensors

PROFESSIONAL EXPERIENCE

SeaWing October 2023 - Present
Founder, CEO

- Designing uncrewed platforms for research, defense, and commercial offshore applications.

Sea Education Association June 2024 - August 2024
Visiting Oceanography Faculty

- Developed lecture materials and planned field expeditions for a college-level introductory short course in oceanography.
- 120 hours of teaching experience as the lead instructor.

Massachusetts Institute of Technology August 2018 - October 2021
Graduate Resident Advisor

- Provided mentoring and guidance for students living in the residential dormitory facilities of MIT.
- Planned events to help students manage stress and facilitate positive interpersonal relationships.

Virgin Hyperloop One September 2015 - September 2017
Marine Engineer

- Led the marine research program.
- Developed regional ocean models driven by wind, wave, and tidal data.
- Developed and validated a non-linear heat transfer model for a full-scale prototype hyperloop system.
- Formulated requirements and conducted the initial design of a tubular thermal expansion joint.

United States Geological Survey July 2015 - February 2016
Independent Contractor

- Assisted in the development of a sediment transport model that integrates longshore and cross-shore processes to predict long-term shoreline response to climate change.
- The results of this research effort were published in the Journal of Geophysical Research Earth Surface.

PUBLICATIONS

Vitousek, S., P. L. Barnard, P. Limber, L. Erikson, and **B. Cole** (2017) *A model integrating longshore and cross-shore processes for predicting long-term shoreline response to climate change*, J. Geophys. Res. Earth Surf., 122, 782–806, doi: 10.1002/2016JF004065.

Cole, B., M. R. Benjamin, and S. Randeni (2021) *AIS-Based Collision Avoidance in MOOS-IvP using a Geodetic Unscented Kalman Filter*, OCEANS 2021: San Diego – Porto, 2021, pp. 1-10, doi: 10.23919/OCEANS44145.2021.9705900.

Cole, B. and G. Schamberg (2022) *Unscented Kalman filter for long-distance vessel tracking in geodetic coordinates*, Applied Ocean Research, 124, doi: 10.1016/j.apor.2022.103205

Cole, B. (2024) *Wingsail design methodology and performance evaluation metrics for autonomous sailing*, PhD thesis, Massachusetts Institute of Technology, doi: 10.1575/1912/69625

Cole, B. and P. Traykovski (2024) *Geometric Programming for Aerodynamically-Actuated Wingsail Design Optimization*, IEEE Journal of Oceanic Engineering [*in review*]

Cole, B. and P. Traykovski (2024) *In-situ Performance Validation and System Identification for Aerodynamically-Actuated Wingsails*, IEEE Journal of Oceanic Engineering [*in preparation*]

INVITED PRESENTATIONS

Cole, B. (2022) *Rigid Wingsail Geometry Optimization and Performance Validation*, MOOS-DAWG 2022, MIT, Cambridge MA.

PATENTS

Pearse, L. and **Cole, B.** (2022) *Expansion joints for a tubular transport system* (U.S. Patent No. 11,421,809). U.S. Patent and Trademark Office.

Cole, B. and Stol, I. (2018) *Corrosion-resistant fluid membrane* (U.S. Patent No. 10,077,540). U.S. Patent and Trademark Office.

Hammer, K. and **Cole, B.** (2016) *Self-healing metal composite tube walls* (U.S. Patent No. 10,682,823). U.S. Patent and Trademark Office.

FIELD RESEARCH EXPERIENCE

Autonomous Sailing Field Trials 2024
MIT, Woods Hole Oceanographic Institution Woods Hole, MA

- Principal Investigators: Blake Cole, Peter Traykovski
- Outfitted a 1.7 meter fiberglass hull with various sensors and actuators to enable autonomous sailing.
- Mounted a custom-built aerodynamically-actuated rigid wingsail on the prototype hull.
- Sailed upwind autonomously, in order to collect deterministic vessel speed polar plot data.

Wingsail Performance Analysis 2023 - 2024
MIT, Woods Hole Oceanographic Institution Woods Hole, MA

- Principal Investigators: Blake Cole, Peter Traykovski
- Designed, built, and deployed a bespoke wingsail data acquisition apparatus, in order to assess wingsail performance in realistic operating conditions.
- Leveraged phase-optimized multisine inputs to characterize the frequency response of multiple wingsails.

Turbulent Sediment Flocculation Study May 2015
Stanford University Sacramento River, CA

- Principal Investigators: Ivy Huang, Stephen Monismith
- Responsible for obtaining water samples at various depths using a Niskin bottle rosette, which I deployed using a hydraulic deck crane aboard the *RV Questurary*.
- Obtained periodic turbulence measurements using a vertical microstructure profiler (VMP).

Marine Ecologic Index Survey of San Diego Bay September 2013
Naval Information Warfare Center - Pacific San Diego Bay, CA

- Principal Investigator: Kara Sorensen
- Assisted with visual surveys of marine fauna in San Diego Bay.
- Compiled survey observations into a report aimed at identifying native, introduced, and cryptogenic species present on multiple natural and artificial habitats within San Diego Bay.

Benthic Microbial Fuel Cell Deployment April 2013
Naval Information Warfare Center - Pacific 24 km Southwest of Pt. Loma, CA

- Principal Investigator: Kenneth Richter
- Recovered a fuel cell from a maximum depth of 1000 meters, after 35 days of deployment.
- Responsible for acoustic release operation.

CERTIFICATIONS

Amateur Radio Technician (KN6GXA)	2020
Delft3D Flexible Mesh: Coastal Morphodynamics	2015
NI LabVIEW Boot Camp	2015
All-Terrain Vehicle (ATV) Operator	2015
AAUS Scientific Diver	2013

PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers (IEEE), Member	Since 2019
Marine Technology Society (MTS), Member	Since 2021

VOLUNTEERING & LEADERSHIP

MIT Graduate Student Leadership Incubator	2019 - 2021
MIT MakerWorkshop, Mentor	2018 - 2021
Surfrider Foundation, Member	2018 - 2021
NOSB Blue Lobster Bowl (MIT), Judge	2018 - 2019
NOSB Sea Lion Bowl (Stanford), Judge	2015 - 2017
IEEE-OCEANS Conference Student Volunteer	2013
Scripps Institution of Oceanography, Coral Reef Lab Volunteer	2013

ACHIEVEMENTS

Ocean Exchange Collegiate Award Finalist	2023
IEEE-OCEANS 2021 Poster Competition Finalist	2021
Martha's Vineyard Open Water Swim (1.9 Hours, 4 Miles)	2021
WHOI Ocean Ventures Fund Awardee	2020
MIT Sandbox Entrepreneurship Program, Seed Fund Awardee	2019
DOD-SMART Fellow	2018
Stanford Vennard Fellowship Awardee	2014
Hiked John Muir Trail (21 Days, 230.3 Miles)	2014
UCSD Warren College Literary Contest, Winner	2010
UCSD Warren College Literary Contest, Runner-Up	2009