BLAKE IAN BARRY COLE

Marine & Aerospace 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

- Building state-of-the-art uncrewed surface vessels for academic research, defense, and commercial offshore applications.
- Consulting for marine vehicle autonomy and design optimization.

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.

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

- Provided mentorship and guidance for students living in MIT's residential dorm facilities.
- 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 nonlinear 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 integrating longshore and cross-shore processes for predicting 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*