Victoria Preston

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Education

Ph.D. Candidate in Aeronautics and Astronautics and Applied Ocean Physics and Engineering sept. 2019 - present

Massachusetts Institute of Technology and Woods Hole Oceanographic Institution Joint Program, Advisors: Anna Michel (WHOI), Nicholas Roy (MIT), Committee: Anna Michel, Nicholas Roy, Youssef Marzouk, Adam Soule, GPA: 5.0/5.0

S.M. in Aeronautics and Astronautics june 2017 - aug. 2019

Massachusetts Institute of Technology and Woods Hole Oceanographic Institution Joint Program, Advisors: Anna Michel (WHOI), Nicholas Roy (MIT), GPA: 5.0/5.0

B.S. in Robotics Engineering sept. 2012 - may 2016

Olin College of Engineering, Cross-Registration at Wellesley College for Education Psychology and Policy, Advisor: Andrew Benett, GPA: 3.93/4.0

Research and Employment Experience

Present | *Robust Robotics Laboratory – MIT*

Graduate Researcher | Robotics, Representation Learning

Advised by Nicholas Roy, I develop strategies for learning representations from online, streaming observations taken by robots in order to inform models that can be subsequently exploited for planning.

Present | *Chemical Sensing Laboratory – WHOI*

Graduate Researcher | Field Robotics, Adaptive Sampling

Advised by Anna Michel, I design field-ready robotic platforms which integrate novel spectroscopic instruments for *in situ* observation of geochemical compounds in air and marine environments with the ultimate goal of deploying these vehicles for long-term adaptive monitoring. Field work in the Arctic, Cascadia Margin, and local estuaries complements this development.

2016-2017 | *Centre for Biorobotics – Tallinn University of Technology*

Visiting Student Researcher | Field Robotics, Autonomy

Advised by Maarja Kruusmaa and funded by the Fulbright Program, I developed control schemes for a biomimetic turtle robot for visual-servoing and target tracking,

autonomous behaviors for examining unknown and enclosed spaces (for marine archaeological applications) assuming severe sensing limitations, and assisted in a large multi-institution project (FP7 SUNRISE) for underwater vehicle coordination.

2016 | *Uber Advanced Technologies Center – Pittsburgh, PA*
Software Engineering Intern | Mapping, System Safety, and Tooling
Developed mapping, visualization, and interface tools related to data transmission and remote system safety diagnosis.

2015-2016 | *Ivani LLC – Dardenne Prairie, MO*
Research Intern | Wireless Sensing and IoT
Co-developed a novel strategy for occupancy sensing using distributed, wireless nodes for industrial building resource management.

2014-2016 | *Olin Robotics Laboratory – Olin College*
Undergraduate Researcher | Field Robotics and Autonomy
Developed physical platforms and simple autonomous systems to allow ground, surface, and flying robots to conduct long-term long-range remote sensing and exploratory missions for scientists, including *SnotBot,* a drone for cetacean study.

2014-2015 | *Indico Data Solutions – Boston, MA*
Occasional Blogspot | Machine Learning
Wrote two blog posts on broader applications of data analysis and machine learning for robotic and conservation/sustainability/development.

2014 | *Locus Robotics – Devens, MA*
Robotics Intern | Platform Development and Autonomy
Responsible for development of the first prototype of a collaborative warehouse fulfillment robot for the company while in stealth mode, including autonomous navigation and simple behaviors.

Grants, Honors, and Awards

Ocean Ventures Fund | *"The intent of the Ocean Ventures Fund is to promote research and innovation by encouraging graduate students to take chances for their thesis research or for developing their thesis project."* Project funds will support work on the development of mobile geochemical observatories (drone platform and in situ sensors). *WHOI,* 2020

National Defense Science and Engineering Graduate Fellowship | 2017

National Science Foundation Graduate Fellowship | 2017, declined

Fulbright Student Grant | *"The program facilitates cultural exchange through direct interaction on an individual basis in the classroom, field, home, and in routine tasks, allowing the grantee to gain an appreciation of others' viewpoints and beliefs, the way they do things, and the way they think."* Hosted by the US Embassy in Estonia, 2016

Innovating Curriculum Grant | Provided to support summer work developing workshop materials and qualitative analysis of the Olin curriculum for internal faculty development. *Olin College*, 2013

Publications and Works

* indicates equal contribution

THESES

Adaptive Sampling of Transient Environmental Phenomena with Autonomous Mobile Platforms. Massachusetts Institute of Technology and Woods Hole Oceanographic Institution. *S.M. Aeronautics and Astronautics.* 2019.

JOURNAL ARTICLES

A.P.M. Michel, **V. Preston**, K.E. Fauria, D.P. Nicholson. "Observations of Shallow Methane Bubble Emissions from Cascadia Margin" *in prep,* 2020.

A.P.M. Michel, A.E. Morrison, **V. Preston**, C.T. Marx, B.C. Colson, H.K. White. "Rapid Identification of Plastics via Spectroscopic Techniques and Classification Methods" *Environmental Science and Technology*, 2020.

C. Manning, **V. Preston**, S. Jones, A.P.M. Michel, D.P. Nicholson, P. Duke, M. Ahmed, K. Manganini, B. Else, P. Tortell. "River Inflow Dominates Methane Emissions in an Arctic Coastal System" *Geophysical Research Letters,* 2020.

V. Preston*, G. Flaspohler*, A.P.M. Michel, Y. Girdhar, N. Roy. "Information-Guided Maximum Seek-and-Sample in Partially Observable Continuous Environments" *IEEE Robotics and Automation Letters (additionally presented at IROS Macau)*, 2019.

V. Preston, T. Salumäe, M. Kruusmaa. “Underwater Confined Space Mapping by Resource-Constrained Autonomous Vehicle” *Journal of Field Robotics, 35(7) 1122-1148*, 2018.

CONFERENCE PAPERS

G.J. Stein*, C. Bradley*, **V. Preston***, N. Roy. “Enabling Topological Planning with Monocular Vision” *IEEE Conference on Robotics and Automation*, 2020.

N. Yoder, **V. Preston**, A.P.M. Michel. “The PEST: Platform for Environmental Sensing Technology” *IEEE/MTS OCEANS Marseilles*, 2019.

G. Frost, D.M. Lane, N. Tsiogkas, D. Spaccini, M. Kruusmaa, **V. Preston**, T. Salumäe. “MANgO: federated world Model using an underwater Acoustic NetwOrk” *IEEE/MTS OCEANS Aberdeen*, 2017.

S. Chandra*, R. Chapman*, R. DiVerdi*, J. Woo*, **V. Preston***, A. Bennett, D. Barrett. “Protocol for Autonomous Landing of Unmanned Air Vehicles on Research Vessels” *IEEE/MTS OCEANS Monterey*, 2016.

V. Preston*, J. Woo*, S. Chandra*, D. Diggins*, R. Chapman*, A. Wee*, Z. Wang*, M. Rush*, A. Bennett, I. Kerr. “Autonomous Vehicles for Remote Sample Collection: Enabling Marine Research” *IEEE/MTS OCEANS Genova,* 2015.

V. Preston*, J. Woo*, S. Chandra*, D. Diggins*, R. Chapman*, A. Wee*, Z. Wang*, M. Rush*, L. Lye*, S. Hughes*, M. Tieu*, A. Bennett, I. Kerr. “Autonomous Vehicles for Remote Sample Collection in Difficult Conditions: Enabling Remote Sample Collection by Marine Biologists” *IEEE Technologies for Practical Robot Applications,* 2015.

PRESENTATIONS

A.P.M. Michel, A.S. Johnson, K. Fauria, **V. Preston**, D.P. Nicholson, D. Hoer, P.R. Girguis, S.D. Wankel. “From the Seafloor to the Surface: In situ Chemical Analysis of Rising Bubbles along the Cascadia Margin” *Ocean Science Meeting of the American Geophysical Union*, 2020.

V. Preston*, G. Flaspohler*, N. Roy, J.W. Fisher III, A. Soule, A.P.M. Michel. “Autonomous Sensing with Scientific Machine Learning for Monitoring Greenhouse Gas Emissions” *NeurIPS Workshop Tackling Climate Change with Machine Learning*, 2019.

C. Manning, Z. Zheng, **V. Preston**, A. Bourbonnais, K. Manganini, A.P.M. Michel, D.P. Nicholson, S.D. Wankel, P. Tortell. “Repeat Measurements of Methane and Nitrous Oxide Distributions Across the North American Arctic Ocean from 2015-2018” *Geophysical Research Abstracts*, 2019.

D.P. Nicholson, A.P.M. Michel, S.D. Wankel, K. Manganini, **V. Preston**, R. Sugrue, Z. Sandwith. “Rapid Mapping of Dissolved Greenhouse Gases in Two New England Estuaries Using the ChemYak Autonomous Surface Vehicle” *Ocean Sciences Meeting of the American Geophysical Union*, 2018.

A.P.M. Michel, D.P. Nicholson, S.D. Wankel, K. Manganini, **V. Preston**, L.A. Catipovic, R. Sugrue, Z. Sandwith, S. Monk. “The ChemYak: An Advanced Autonomous Surface Platform for Chemical Mapping” *Ocean Sciences Meeting of the American Geophysical Union*, 2018.

L.A. Catipovic, A.P.M. Michel, D.P. Nicholson, S.D. Wankel, K. Manganini, **V. Preston**, S. Monk. “Advancing a JetYak Autonomous Surface Vehicle for Vertical Chemical Profiling” *Ocean Sciences Meeting of the American Geophysical Union*, 2018.

REVIEWS

C. Bradley*, **V. Preston***. “A Self-Driving License: Ensuring Autonomous Vehicles Deliver on the Promise of Safer Roads” *MIT Science Policy Review*, 2020.

PATENTS

J. Wootton, M. Wootton, C. Nissman, **V. Preston**, J. Clark, J. McKinney, C. Barnes. “Detecting Location within a Network” *US Patent Numbers 10667086, 10397742, 10064013, 9693195, 9474042*.

M. Wootton, J. McKinney, M. Crowell-Ingram, E. Dorsky, S. Mehrotra, E. Pierce, **V. Preston**, J. Clark, Z. Wei. “Electrical monitoring and network enabled electrical faceplate” *US Patent Numbers 10627253, 10072942*.

Activities and Service

Professional Leadership and Committee Roles

2018-present | Departmental Resource for Easing Friction and Stress (dREFS); trained peer mediator for Aeronautics and Astronautics graduate students

2019-present | MIT-WHOI Joint Program Applied Ocean Science and Engineering Graduate Student Representative

2015-2016 | Olin College Sexual Respect Team member

2013-16 | Olin Honor Board member (2013-14), Chair (2014-15), Vice Chair (2015-16)

2013-14 | Olin College Curriculum Innovation Committee Student Member

2012-13 | Olin Honor Code Review Committee First Year Representative

Professional Mentorship

2018-present | MIT Undergraduate Research Opportunities Program (UROP) Graduate Mentor through the Robust Robotics Group; directly supervised 6 undergraduates

2018-present | MIT UROP Graduate Mentor through the Chemical Sensing Laboratory; directly supervised 3 undergraduates

2018 | Woods Hole Partnership in Education Program (PEP) Graduate Student Mentor; directly supervised one undergraduate

2020-present | MIT-WHOI Joint Program Applicant Support and Knowledgebase mentor

2020-present | Aeronautics and Astronautics Peer Mentor

Professional Teaching Activities

Olin College | Course Assistant for: ENGR 1125 Introduction to Sensors, Instrumentation and Measurement, SCI 1130 Mechanics, ENGR 2199B Regional Analysis for Development, ENGR 2210 Principles of Engineering, ENGR 3370 Controls, experimental course Quantitative Engineering Analysis

Professional Membership

2014-present | Marine Technology Society (MTS) student member

2019-present | IEEE student member

Review Activities

1. Applied Sciences
2. Journal of Field Robotics
3. IEEE International Conference on Robotics and Automation
4. IEEE Robotics and Automation Letters
5. IEEE International Conference on Intelligent Robots and Systems
6. International Journal of Robotics Research

Volunteer and Other Activities

2016-present | Olin College Alumni Interviewer for prospective applicants and selected candidates; alumni postgraduate panel member

2016-present | Virtual Mentor for IB Engineering Course at Del Mar High School, CA

2016-2017 | EducationUSA Tallinn American English Conversation Club Coordinator

2013-2016 | STEM enrichment coordinator for local Public Housing Authority childcare

2013-14 | Olin College Residential Resource (equivalent to residential advisor)

2012-2014 | FIRST Robotics Lego League (grades 3-8) and Robotics Challenge (grades 9-12) mentor