

# Amy Phung

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## EDUCATION

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**Massachusetts Institute of Technology & Woods Hole Oceanographic Institution Joint Program** June 2021 – Present  
*Cambridge, MA*

*Ph.D. Student in Aeronautics and Astronautics & Applied Ocean Science and Engineering*

- Advised by: Richard Camilli
- GPA: 4.8/5.0

**Olin College of Engineering** August 2017 – May 2021  
*Needham, MA*

*B.S. in Engineering: Robotics*

- Recipient of 4-year, Olin Merit Tuition Scholarship valued at more than \$100,000
- GPA: 4.0/4.0

**Sea Education Association** January 2020 – March 2020  
*Woods Hole, MA*

*Global Oceans Program*

- Conducted a comparative study between three different sources of chlorophyll-a measurements: satellites, robotic Biogeochemical Argo floats, and shipborne fluorometers

## RESEARCH EXPERIENCE

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**Woods Hole Oceanographic Institution** June 2021 – Present  
*Woods Hole, MA*

*Graduate Research Assistant*

- Conducting research to improve perception systems for deep-sea manipulators. Developed virtual reality (VR) and desktop interfaces to support participation from remote scientists within shared autonomy framework for at-sea testing off the coast of Southern California

**Olin College Senior Consulting Project in Engineering** September 2020 – May 2021  
*Needham, MA*

*Product Owner*

- Developed VR interfaces using Unity and C# for the Monterey Bay Aquarium Research Institute (MBARI) to improve ROV piloting for scientific sampling
- Implemented human-robot interactions in VR with hand gestures and gaze tracking
- Coordinated activities and design reviews for a 5-person engineering team
- Co-authored user study publication in collaboration with researchers at UC Santa Cruz and MBARI

**Olin Ground Robotic Autonomous Vehicle Lab** October 2017 – May 2021  
*Needham, MA*

*Lead Student Researcher*

- Co-lead project involving machine learning based obstacle detection and classification in a 3D LiDAR scan to aid navigation. Project was selected as a finalist in the Panasonic Prototype 3D LiDAR Challenge, which provided \$2,500 for project funding and a prototype LiDAR
- Simulated robotic tractor in Gazebo with ROS integration to augment off-board testing capabilities, reducing test cycle time from 3-hour field tests to 1-hour of debugging in simulation
- Developed algorithms for path planning research related to autonomous dirt road leveling
- Designed and implemented electromechanical three-point hitch subsystem to actuate road grader
- Established ROS communications between onboard sensors, actuators, and computing systems

**Woods Hole Oceanographic Institution** June 2020 – September 2020  
*Woods Hole, MA*

*Summer Student Fellow*

- Developed a computer vision-based calibration method to characterize sensor-to-angle relationships for 6 degree-of-freedom manipulators without physical operator assistance for use in remote underwater environments
- Implemented method using ROS, C++, and Python for testing with a physical hydraulic manipulator testbed setup

## INDUSTRY EXPERIENCE

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### Relativity Space

May 2019 – August 2019

*Automation Intern*

*Inglewood, CA*

- Developed and tested computer vision algorithms and controls to automate high-precision end-effector position adjustments on industrial manipulators in a noisy welding environment. Enabled precise  $< 0.01$  mm adjustments on a robot whose accuracy specifications were  $\pm 0.05$  mm. Project increased team bandwidth by reducing frequency of off-hours requests to on-call engineer

### GE Aviation

May 2018 – August 2018

*Product Support Intern*

*Lynn, MA*

- Spearheaded development on Rotorcraft Operations Center (ROC), a project that automates the process of pulling and manipulating raw helicopter engine data from a database and applies statistical tools to create virtual dashboards for predictive fleet monitoring
- Developed software in Python to aid in engine dataset analysis, which reduced analysis time from 2 hours to 5 minutes

## PUBLICATIONS

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**A. Phung**, G. Billings, A.F. Daniele, M.R. Walter, R. Camilli, “Democratizing access to the deep sea: Shared autonomy for remote underwater manipulation” 2023. (In prep)

G.Billings, **A. Phung**, R. Camilli, “DVL-Based Odometry for Autonomous Underwater Gliders” 2023. (submitted)

A. Elor, T. Thang, B. Hughes, A. Crosby, **A. Phung**, E. Gonzalez, K. Katija, S. Haddock, E. Martin, B. Erwin, L. Takayama, “Catching Jellies in Immersive Virtual Reality: A Comparative Teleoperation Study of ROVs in Underwater Capture Tasks” *ACM Symposium on Virtual Reality Software and Technology (VRST)*, 2021. **\*\*Best Paper Award\*\***

E. Martin, B. Erwin, K. Katija, **A. Phung**, E. Gonzalez, S. Thun, H. Cullen, S. Haddock, “A Virtual Reality Video System for Deep Ocean Remotely Operated Vehicles” *IEEE/MTS OCEANS San Diego - Porto*, 2021.

**A. Phung**, “A comparison of Biogeochemical Argo sensors, remote sensing systems, and shipborne field fluorometers to measure Chlorophyll-A concentrations in the Pacific Ocean off the northern coast of New Zealand” *IEEE/MTS OCEANS Singapore-U.S. Gulf Coast*, 2020.

## PRESENTATIONS

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**A. Phung**, G. Billings, A. Daniele, M. Walter, R. Camilli, “Partially automated robotic manipulation assisted by a shared autonomy framework for collaborative analysis and input from multiple remote scientists through natural language input and 3D scene understanding for real-time, in-situ elemental analysis” *Ocean Sciences Meeting*, 2022.

**A. Phung**, G. Billings, A. Daniele, M. Walter, R. Camilli, “Toward Efficient Under-Ice Exploration of Ocean Worlds Using Distributed Autonomy and 3D Workspace Reconstruction Presented in VR for Intuitive Understanding” *Astrobiology Science Conference*, 2022.

## GRANTS, HONORS, AND AWARDS

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**Link Ocean Engineering & Instrumentation Fellowship** : \$34,000 | Sept. 2022

**National Science Foundation (NSF) Graduate Research Fellowship**: \$138,000 | Sept. 2021

**Woods Hole Oceanographic Institution Summer Student Fellowship**: \$6,500 | June 2020 – August 2020

**Olin Tuition Scholarship**: Four-year half-tuition merit scholarship, \$100,800 | Aug. 2017 – May 2021

**Santa Clarita Valley Scholarship Foundation Scholarship**: \$1,000 | May 2017

**College of the Canyons Foundation Scholarship**: \$1,000 | May 2017