Amy Phung

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Education

Massachusetts Institute of Technology & June 2021 – Present
Woods Hole Oceanographic Institution Joint Program *Cambridge, MA*
Ph.D. Student in Aeronautics and Astronautics & Applied Ocean Science and Engineering

- Advised by: Richard Camilli

Olin College of Engineering August 2017 – May 2021
B.S. in Engineering:Robotics *Needham, MA*

- 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
Global Oceans Program *Woods Hole, MA*

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

Research Experience

Woods Hole Oceanographic Institution June 2021 – Present
Graduate Research Assistant *Woods Hole, MA*

- 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
Product Owner *Needham, MA*

- 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, gaze tracking, and foot-based controls
- Coordinated activities and design reviews for a 5-person engineering team
- Maintained team communications with MBARI scientists and engineers through weekly presentations

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

- Developed software for machine learning based obstacle detection and classification in 3D pointclouds. Project was competitively selected as a Finalist in the Panasonic Prototype 3D LiDAR Competition
- Simulated a robotic tractor in Gazebo with ROS integration to augment off-board testing capabilities, reducing iterative test cycle time from a 3-hour field test to 1-hour of debugging in simulation
- Developed algorithms for path planning research related to autonomous dirt road leveling and maintenance
- Designed and implemented the electromechanical three-point hitch subsystem to actuate a road grader
- Established ROS communications between the high and low-level control systems for interfacing with sensors and actuators

Woods Hole Oceanographic Institution June 2020 – September 2020
Summer Student Fellow *Woods Hole, MA*

- 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 hydrualic manipulator testbed setup

Industry Experience

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 ± 0.05 mm
- Increased team bandwidth by reducing frequency of off-hours requests to on-call engineer through aforementioned adjustments
- Ran proof-of-concept tests of software containerization for testing and deployment
- Worked with industrial robot arms on the world's largest metal 3D printer used for constructing rocket tanks

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 applying statistical tools to create virtual dashboards for predictive fleet monitoring
- Tested and developed a python-based webcam mouse with OpenCV to make user-friendly controls for the large ROC display
- Developed custom python-based GUI through rapid iterations based on user input, reduced raw engine dataset analysis time from 2 hours to 5 minutes

Publications

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.

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

A. Phung, 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.

Grants, Honors, and Awards

National Science Foundation (NSF) Graduate Research Fellowship: \$138,000 | Sept. 2021 – May 2024
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