Zach Duguid

MIT-WHOI Joint Program
Graduate Student

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978-998-9348

Education

- **Massachusetts Institute of Technology** **Cambridge, MA**
  Master of Science in Aerospace Engineering *Sep 2018 – Jun 2020*
  - **Advisers:** Brian Williams and Richard Camilli
- **Massachusetts Institute of Technology** **Cambridge, MA**
  Bachelor of Science in Aerospace Engineering, Minor in Computer Science *Sep 2014 – Jun 2018*
  - **GPA:** 4.9/5.0

Research Experience

- **Australian Centre for Field Robotics** **Sydney, NSW**
  Visiting Researcher *Jun 2018 – Aug 2018*
  - Implemented a Generative Adversarial Network (GAN) machine learning architecture to make bathymetry predictions given sparse sonar readings, a prediction problem similar to inpainting
  - Generated large sets of training data by simulating vehicle dynamics and scanning sonar measurements
- **Computer Science & Artificial Intelligence Laboratory** **Cambridge, MA**
  Undergraduate Researcher *Sep 2017 – May 2018*
  - Deployed an array of AUVs near the Hawaiian Islands to demonstrate human-robot interaction, multi-agent execution, and adaptive sampling techniques in a challenging ocean environment
  - Developed energy-optimized path planning capabilities for AUVs using an MDP framework
  - Implemented a novel method for modeling obstacles to increase path planning efficiency
- **Woods Hole Oceanographic Institution** **Woods Hole, MA**
  Summer Research Fellow *May 2017 – Aug 2017*
  - Created a graphical user interface to monitor the battery state of the Slocum Glider vehicle
  - Performed vehicle range analysis for different power mode scenarios and current conditions
  - Designed and built the internal battery pack chassis to maximize strength and minimize weight
- **Man Vehicle Laboratory** **Cambridge, MA**
  Undergraduate Researcher *Feb 2016 – May 2016*
  - Assessed the accuracy of the Enhanced Dynamic Load Sensor for the International Space Station (EDLS-ISS), which is used for strength training in microgravity environments
  - Extracted motion data from test subjects performing various weightlifting movements while experiencing microgravity via NASA's parabolic flight program to develop a musculoskeletal model
- **Hong Kong University of Science and Technology** **Hong Kong, HK**
  Undergraduate Researcher *Jun 2015 – Aug 2015*

- Analyzed protein localization in yeast cells in order to identify novel protein pathways and to generate a model for retrograde transport in yeast cells
- Performed yeast cell transformations, DNA extractions, and PCR amplifications

Work Experience

- **Northrop Grumman** **San Diego, CA**
  Systems Integration, Test, and Evaluation Engineer *Jun 2016 – Aug 2016*
  - Programmed a Google Earth visualization tool that displays flight data from the Global Hawk aircraft by assimilating and synchronizing state variables across multiple data files
  - Operated software and hardware components of the Global Hawk in order to conduct system and subsystem level testing for segment integration and work orders

Teaching Experience

- **Oak House School** **Barcelona, ES**
  High School Teacher *Jan 2017 – Feb 2017*
  - Taught high school students in Calculus, Physics, and Computer Science
  - Devised innovative lessons combining theory and hands-on experiments
- **8.01 – Physics I (MIT)** **Cambridge, MA**
  Teaching Assistant *Aug 2015 – Dec 2015*
  - Taught incoming freshman a framework for solving difficult problems

Academic Projects

- **Rotating Synthetic Aperture Space Telescope** **Cambridge, MA**
  Undergraduate Student *Sep 2017 – Dec 2017*
  - Developed image processing algorithms to demonstrate the feasibility of a rotating synthetic aperture space telescope that is capable of producing images equivalent to traditional circular aperture methods
- **High Speed Autonomous Racecar** **Cambridge, MA**
  Undergraduate Student *Feb 2017 – May 2017*
  - Implemented probabilistic path planning algorithms, pure-pursuit control algorithms, and LiDAR-based localization algorithms to compete in an autonomous racecar controls challenge

Journal Papers

1. **Duguid, Z.**, Williams, B., & Camilli, R. (2017). "Intelligent Endurance for AUV Gliders." MIT Undergraduate Research Journal, Vol. 34.

Conference Papers

1. Camilli, R., **Duguid, Z.**, Ayton, B., Bradley, A., Vaquero, T., Pizarro, O., Mallios, A., Williams, B., & Timmons, E. (2018). "Alone and Unafraid: Extending Autonomous Chemical Reconnaissance into Hazardous Subsea Environments." Ocean Sciences 2018, IS33A-01.

Participation in Workshops & Conferences

IEEE MIT Undergraduate Research Technology Conference (URTC) 2017

Participation in Field Research

New Approaches to Autonomous Exploration at the Costa Rican Shelf Break, R/V Falkor . . 2018
JP Student Orientation Cruise at the Southern New England Shelf, R/V Neil Armstrong . . 2018
Coordinated Robotics 2: 'Au'Au Channel, R/V Falkor 2018

Presentations

Australian Centre For Field Robotics Laboratory Seminar 2018
Preliminary Design Review for Rotating Synthetic Aperture Project 2017
Systems Requirement Review for Rotating Synthetic Aperture Project 2017
WHOI Applied Ocean Physics & Engineering Department Seminar 2017

Awards & Honors

MIT-WHOI Rosenblith Presidential Graduate Fellowship 2018
Chi Phi Educational Trust Scholarship 2017, 2018
WHOI Travel Grant for Outstanding Summer Research 2017
WHOI Summer Fellowship 2017
Academic All-Conference for NCAA Varsity Football 2015, 2016, 2017

Skills, Leadership, & Extracurricular

- **Skills (proficient):** Python, Java, Matlab, Photoshop, CAD (Fusion360), 3D Printing, LaTeX
- **Skills (familiar):** Lisp, C, JavaScript, ROS, Keras, Simulink, Mathematica, User Interface Design
- **Leadership:** Boston Marathon Volunteer, MIT Varsity Football, Fraternity President
- **Extracurricular:** Skiing, Hiking, Traveling, Reading, Photography, Digital Imaging, MIT Pirate