Michael Ouimet, Ph.D.

SUMMARY

Lead engineer with interdisciplinary research experience in planning, control and estimation theory, dynamical systems, and machine learning focusing on robotic applications. Broad range of mathematical modeling, analysis skills, and programming experience (Python, ROS, and some C) with supervisory roles. Strong written and oral communication skills.

EXPERIENCE

Lead Engineer at Naval Information Warfare Center Pacific July 2017 - present

Act as both an individual software development contributor as well as autonomy lead and mentor for several projects involving multi-agent autonomy. Personal contributions include:

- Evaluating and extending computer vision and reinforcement learning algorithms for the perception and control of a multi-drone project
- Simulating a wave-aware path planner for an unmanned surface vehicle to safely maneuver through rough sea state - compared performance of model-based path planning to model-free reinforcement learning
- Developing the controls, estimation, and computer vision algorithms in ROS to allow a Commercial, Off-the-Shelf drone to localize and robustly land on a desired moving platform using a downward-facing camera
- Simulating hierarchical planning algorithms to allow one operator to provide influence over a swarm of unmanned systems for several missions

Engineer at SPAWAR Systems Center Pacific July 2015 - July 2017

- Principal Investigator (PI) on a proposal funded by the Office of Naval Research (ONR) to co-advise a Ph.D. student at UC San Diego in topics of cooperative control and planning for teams of unmanned vehicles, especially focused on multi-agent reinforcement learning (FY17-FY19)
- Co-PI and Algorithm Lead on an internally funded research project on Human-Autonomy Teaming. Implemented a number of Artificial Intelligence motion planning algorithms (A*, MDPs, model-predictive control, supervised learning, reinforcement learning) in Python and evaluated their applicability on solving successively more challenging (and therefore realistic) Navy scenarios
- Aided in the design of a PID control law for an unmanned military vehicle. Developed a training document for applying multisensor data fusion techniques (SLAM, Kalman Filter and extensions, Particle Filter, data association) to unmanned military vehicles

Postdoctoral researcher at UC San Diego Apr 2014 - Jun 2015

- Developed mathematical model for information throughput of team of aerial, mobile, internet-providing vehicles and designed novel motion control algorithm to deploy over Earth's atmosphere, providing optimal service subject to motion constraints
- Created event-triggering strategy for cooperative localization algorithm to provide robots' ability to estimate own location cooperatively while minimizing communication costs. Compared novel algorithm to standard baseline algorithms to investigate the tradeoff between communication cost and system performance
- Supervised undergraduate and graduate researchers in individual projects towards developing capabilities of lab's new multi-robot testbed, helped determine and direct the long-term focus of the testbed. Team successfully demonstrated several algorithms including localization, SLAM, multi-agent deployment, and cyclic pursuit

Graduate student at UC San Diego Sep 2009 - Apr 2014

- Worked on interdisciplinary team with Scripps Institute of Oceanography research engineers and oceanographers to develop algorithms for underwater buoyancy-controlled drifters. Designed, simulated, and validated cooperative algorithms to estimate parameters of ocean internal waves off coast of San Diego. Algorithm estimated the desired parameters from real data and results are being transferred to the oceanographic community
- Developed and simulated novel motion control algorithm where ocean drifters utilize their knowledge of the ocean wave flowfield to maneuver in desired direction by moving vertically in the water column, harnessing varying water speeds. Received honorable mention for presentation of this work at the UCSD Engineering Research Expo 2014.
- Developed and simulated cooperative algorithm to optimally deploy team of unreliable mobile robotic sensors across an environment. Algorithm has applications in area surveillance and monitoring of environments where communication is challenging, such as underwater

Engineering internship at Otis Elevator Company Summer 2006, 2007

- Measured elevator noise and developed a script to analyze its frequency spectrum for the purpose of fault detection.
- Documented, re-implemented, and added functionality to a script of an elevator belt wear model. This piece of software was easier for anyone to edit, well documented, and had one tenth the runtime

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ADDITIONAL INFORMATION

- Audited Micro-MBA course for academics through the UCSD Rady School of Management
- Led lab outreach tours for High School and University groups to inspire students to join STEM fields and consider careers in robotics/research

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EDUCATION

University of California, San Diego, California, USA
Ph.D., Mechanical and Aerospace Engineering (Advisor: Jorge Cortés), Apr. 2014
-Thesis title: Distributed Cooperation for Robust Estimation
M.S., Mechanical and Aerospace Engineering, Nov. 2010

University of Notre Dame, Indiana, USA
B.S., Mechanical Engineering, Jun. 2009