

CLAIRE WALTON

Research Assistant Professor
Naval Postgraduate School
Mechanical and Aerospace Engineering Dept.
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RESEARCH AREAS

Computational optimal control, pseudospectral and direct methods, robust control of nonlinear systems, parameter uncertainty, autonomous vehicle path planning, mobile sensors, vehicle dynamics modeling, equipment performance modeling, optimal search, mine counter-measures, energy-efficient path planning for endurance flight, largescale systems, empirical observability, real-time optimization, scalable swarm tactics

EDUCATION

- 2015 PhD** University of California, Santa Cruz—Applied Mathematics & Statistics
Dissertation: “The Design and Implementation of Motion Planning Problems Given Parameter Uncertainty”
- 2005 BS** California Institute of Technology—Mathematics
Double Major in Literature
Graduated Summa Cum Laude

APPOINTMENTS

- 2019 – Present** **Research Assistant Professor**
Naval Postgraduate School, Mechanical and Aerospace Engineering Department
- 2015 – 2018** **National Research Council (NRC) Research Associate**
Naval Postgraduate School, Mechanical and Aerospace Engineering Department

GRANT FUNDING

12/1/2018 – 12/31/2019, \$150K Role: Co-PI

Multi-Domain Super Swarm: Robust Tactics for Engaging an Attacking Large-Scale Swarm

Funding Agency: Consortium for Robotics and Unmanned Systems Education and Research

10/1/2017– 9/30/2019, \$310K Role: Co-PI

Fundamental Issues for Observability of Adversarial Swarm Strategies

Funding Agency: Office of Naval Research, Code 35, Science of Autonomy Program

5/18/2017 – 11/17/2018, \$70K Role: PI

Onboard and Real-Time Implementation of Optimal Motion Planning Algorithms with Uncertainty

Funding Agency: National Research Council of the National Academy of Sciences

10/1/2017 – 9/20/2018, \$150K Role: Senior Personnel

Optimal Mission Planning for MCM Vehicles and Sensors

Funding Agency: Naval Research Program

10/1/2016– 9/30/2017, \$255K Role: Co-PI

Fundamental Issues in the Defense Against Autonomous Swarms: Real-Time Defense Strategies for Uncertain Swarms

Funding Agency: Office of Naval Research, Code 35, Science of Autonomy Program

10/1/2016 – 09/30/2017, \$150K Role: Co-PI

Closing the Experimental Gap in the Search and MCM Communities

Funding Agency: Consortium for Robotics and Unmanned Systems Education and Research

5/18/2016 – 5/17/2017, \$70K Role: PI

Robust Modeling and Computation of Motion Planning Problems Given Uncertainty in Motion and Environment

Funding Agency: National Research Council of the National Academy of Sciences

10/1/2015 – 09/30/2016, \$150K Role: Co-PI

Optimal Defense Strategies against a Swarm Attack on a High Value Naval Unit

Funding Agency: Consortium for Robotics and Unmanned Systems Education and Research

10/1/2015 – 09/30/2016, \$150K Role: Senior Personnel

On the use of UxVs in Seabasing Cargo Transfer

Funding Agency: Consortium for Robotics and Unmanned Systems Education and Research

5/18/2015 – 5/17/2016, \$70K

Role: PI

Efficient Computation of Nonlinear Control Problems with Parameter Uncertainty

Funding Agency: National Research Council of the National Academy of Sciences

AWARDS

2015, 2016, 2017 **National Research Council Postdoctoral Fellowship**

National Academy of Sciences

2014

Chancellor's Fellowship

University of California, Santa Cruz

2009

Cota-Robles Fellowship,

University of California, Santa Cruz

JOURNAL PUBLICATIONS

Claire Walton, Isaac Kaminer, and Qi Gong. Consistent Numerical Methods for State and Control Constrained Trajectory Optimization with Parameter Dependency. *International Journal of Control*. Revision under review

Qi Gong, Wei Kang, Claire Walton, Isaac Kaminer, and Hyeongjun Park. Partial Observability Analysis of an Adversarial Swarm Model. *Journal of Guidance, Control, and Dynamics*. Revision under review

Sean Kragelund, Claire Walton, Isaac Kaminer, and Vladimir Dobrokhodov. Generalized Optimal Control for Autonomous Mine Countermeasures Missions. *IEEE Journal of Oceanic Engineering*. Revision under review

Claire Walton, Isaac Kaminer, Vladimir Dobrokhodov, and Kevin D Jones. Alternate strategies for optimal unmanned aerial vehicle thermaling. *Journal of Aircraft*, 55(6):2347–2356, 2018

Claire Walton, Panos Lambrianides, Isaac Kaminer, Johannes Royset, and Qi Gong. Optimal motion planning in rapid-fire combat situations with attacker uncertainty. *Naval Research Logistics (NRL)*, 65(2):101–119, 2018

Venanzio Cichella, Isaac Kaminer, Claire Walton, and Naira Hovakimyan. Optimal motion planning for differentially flat systems using bernstein approximation. *IEEE Control Systems Letters*, 2(1):181–186, 2017

Chris Phelps, Qi Gong, Johannes O. Royset, Claire Walton, and Isaac Kaminer. Consistent approximation of a nonlinear optimal control problem with uncertain parameters. *Automatica*, 50(12):2987–2997, 2014 (Regular paper)

CONFERENCE PUBLICATIONS

Venanzio Cichella, Isaac Kaminer, Claire Walton, Naira Hovakimyan, Antonio Manuel Pascoal. Consistent Approximation of Optimal Control Problems Using Bernstein Polynomials. *2019 IEEE 58th Conference on Decision and Control (CDC)*. Accepted

Hyeongjun Park, Qi Gong, Wei Kang, Claire Walton, and Isaac Kaminer. Observability analysis of an adversarial swarm’s cooperation strategy. In *14th IEEE International Conference on Control and Automation, Anchorage, Alaska*, 2018

Claire Walton, Isaac Kaminer, Vladimir Dobrokhodov, and Kevin D. Jones. New insights into autonomous soaring. In *2017 IEEE 56th IEEE Conference on Decision and Control (CDC)*, 2017

Claire Walton, Sean Kragelund, and Isaac Kaminer. Issues in multi-agent search: False positives and bayesian map updates. In *OCEANS 2017 MTS/IEEE Aberdeen. IEEE*, 2017

Claire Walton, Chris Phelps, Qi Gong, and Isaac Kaminer. A numerical algorithm for optimal control of systems with parameter uncertainty. *10th IFAC Symposium on Nonlinear Control Systems NOLCOS 2016, IFAC-PapersOnLine*, 49(18):468–475, 2016

Sean Kragelund, Claire Walton, and Isaac Kaminer. Sensor-based motion planning for autonomous vehicle teams. In *OCEANS 2016 MTS/IEEE Monterey*, pages 1–8. IEEE, 2016

Claire Walton, Sean Kragelund, and Isaac Kaminer. The application of ‘optimal search’ to marine mapping. In *OCEANS 2016 MTS/IEEE Monterey*, pages 1–6. IEEE, 2016

CONFERENCE PRESENTATIONS AND INVITED TALKS

Motion Planning for Autonomous Vehicle Teams in Uncertain Environments. Nonlinear and Computational Control: A Workshop to Honor Prof. John Hauser on his 60th Birthday. 2018 American Control Conference, Milwaukee, WI, June 26, 2018

Generalized Optimal Control: Motion Planning for Autonomous Vehicle Teams in Uncertain Environments. Day of Data, Decisions, and Defense, Monterey, CA, August 2017

Generalized Optimal Control: Motion Planning for Autonomous Vehicle Teams in Uncertain Environments. Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) Meeting, Monterey, CA, July 2017

Issues in Multi-Agent Search: False Positives and Bayesian Map Updates. MTS/IEEE OCEANS 2017 Conference, Aberdeen, Scotland, June 2017

The Application of 'Optimal Search' to Marine Mapping. MTS/IEEE OCEANS 2016 Conference, Monterey, CA, September 2016

A Numerical Algorithm for Optimal Control of Systems with Parameter Uncertainty. NOLCOS 2016, 10th IFAC Symposium on Nonlinear Control Systems, Monterey, CA, August 2016

Optimal Sensor Deployment and Information Gathering using UxSs. Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) Technical Continuum, Monterey, CA

Trajectory Optimization Given Parameter Uncertainty. Aerospace Engineering Department Seminar, Ann Arbor, Michigan, May 2016

Defense Against Airborne Swarm Attack. Office of Naval Research Science of Autonomy Meeting, Washington, DC, August 2015

Optimal Motion Planning for Searching for Uncertain Targets. 19th World Congress of the International Federation of Automatic Control, August 2014

TEACHING

2010 – 2014

Graduate Teaching Assistant

University of California, Santa Cruz
Statistics, Calculus, Economics, Symbolic Logic

2008 – 2009

Math Instructor & Teaching Assistant

Horizons Academy, Maui, Hawaii
K-12 specialized education for students with learning disabilities

ADDITIONAL QUALIFICATIONS

T3 Security Investigation completed by the NBIB. Eligible for Secret