Claire Walton

Assistant Professor

Contact Information

Department of Electrical and Computer Engineering, E-mail: claire.walton@utsa.edu
Department of Mathematics
The University of Texas at San Antonio
San Antonio, Texas 78249-0669

Education

Ph.D.	Applied Mathematics and Statistics, University of California Santa Cruz, Santa Cruz CA, 2015. Dissertation: "*The Design and Implementation of Motion Planning Problems Given Parameter Uncertainty.*"
B.S.	Mathematics, California Institute of Technology, 2001.

Professional Experiences

2020-Present	**Assistant Professor**, Dept. of Electrical and Computer Engineering/Dept. of Mathematics, University of Texas at San Antonio, Texas.
2019-2020	**Research Assistant Professor**, Dept. of Mechanical and Aerospace Engineering, Naval Postgraduate School, California.
2005-2012	**National Research Council (NRC) Research Associate,** Dept. of Mechanical and Aerospace Engineering, Naval Postgraduate School, California.

Honors and Awards

2015-2017	**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.

Funded Projects

1. **Co-Principal Investigator:** "Collaborative Research: Algebraic Framework of Compositional Functions for New Structure, Training, and Explainability of Deep Learning," $622,955, National Science Foundation, 01/2022-12/2024.
2. **Co-Principal Investigator:** "UTSA Faculty Development in Cybersecurity of Digital I&C in Nuclear Power Plants Research and Education," $450,000, U.S. Nuclear Regulatory Commission, 06/2021-09/2023.
3. **Senior Personnel:** "REU Site: Artificial Intelligence Powered Robotics in 5G Network," $403,354, National Science Foundation, 03/2021-03/2024.
4. **Co-Principal Investigator:** "Fundamental Issues for Observability of Adversarial Swarm Strategies," $310,000, Office of Naval Research, 10/2017-6/2020.
5. **Co-Principal Investigator:** "Multi-Domain Super Swarm: Robust Tactics for Engaging an Attacking Large-Scale Swarm," $150,000, Consortium for Robotics and Unmanned Systems Education and Research (CRUSER), Naval Postgraduate School, 12/2018-12/2019.
6. **Principal Investigator:** "Onboard and Real-Time Implementation of Optimal Motion Planning Algorithms with Uncertainty," $70,000, National Research Council of the National Academy of Sciences, 5/2017-11/2018.

7. **Senior Personnel:** "Optimal Mission Planning for MCN Vehicles and Sensors," $150,000, Naval Research Program, 10/2017-9/2018.
8. **Co-Principal Investigator:** "Fundamental Issues in the Defense Against Autonomous Swarms: Real-Time Defense Strategies for Uncertain Swarms," $255,000, Office of Naval Research, 10/2016-9/2017.
9. **Co-Principal Investigator:** "Closing the Experimental Gap in the Search and MCM Communities," $150,000, Consortium for Robotics and Unmanned Systems Education and Research (CRUSER), Naval Postgraduate School, 10/2016-0/2017.
10. **Principal Investigator:** "Robust Modeling and Computation of Motion Planning Problems Given Uncertainty in Motion and Environment," $70,000, National Research Council of the National Academy of Sciences, 5/2016-5/2017.
11. **Co-Principal Investigator:** "Optimal Defense Strategies against a Swarm Attack on a High Value Naval Unit," $150,000, Consortium for Robotics and Unmanned Systems Education and Research (CRUSER), Naval Postgraduate School, 10/2015-9/2016.
12. **Senior Personnel:** "On the use of UxVs in Seabasing Cargo Transfer," $150,000, Consortium for Robotics and Unmanned Systems Education and Research (CRUSER), Naval Postgraduate School, 10/2015-9/2016.
13. **Principal Investigator:** "Efficient Computation of Nonlinear Control Problems with Parameter Uncertainty," $70,000, National Research Council of the National Academy of Sciences, 5/2015-5/2016.

Publications:

Google Scholar: H-index 6, Citations: 183.
https://scholar.google.com/citations?authuser=1&user=9QrzRRwAAAAJ

(a) Journal Papers (Total:11)

1. Claire Walton, Isaac Kaminer, Qi Gong, Abram Clark, Theodoros Tsatsanifos, et al. Defense against adversarial swarms with parameter uncertainty. arXiv preprint arXiv:2108.04205, 2021
2. Theodoros Tsatsanifos, Abram H Clark, Claire Walton, Isaac Kaminer, and Qi Gong. Modeling and control of large-scale adversarial swarm engagements. arXiv preprint arXiv:2108.02311, 2021
3. Sean Kragelund, ClaireWalton, Isaac Kaminer, and Vladimir Dobrokhodov. Generalized optimal control for autonomous mine countermeasures missions. IEEE Journal of Oceanic Engineering, 46(2):466-496, 2020. https://doi.org/10.1109/JOE.2020.2998930
4. Walton, C., Kaminer, I., & Gong, Q. (2021). Consistent numerical methods for state and control constrained trajectory optimisation with parameter dependency. *International Journal of Control*, 1-11. https://doi.org/10.1080/00207179.2020.1717633
5. Cichella, V., Kaminer, I., Walton, C., Hovakimyan, N., & Pascoal, A. M. (2020). Optimal Multi-Vehicle Motion Planning using Bernstein Approximants. *IEEE Transactions on Automatic Control*. https://doi.org/10.1109/tac.2020.2999329
6. Gong, Q., Kang, W., Walton, C., Kaminer, I., & Park, H. (2020). Partial Observability Analysis of an Adversarial Swarm Model. *Journal of Guidance, Control, and Dynamics*, *43*(2), 250-261. https://doi.org/10.2514/1.g004115
7. Kragelund, S., Walton, C., Kaminer, I., & Dobrokhodov, V. (2020). Generalized Optimal Control for Autonomous Mine Countermeasures Missions. *IEEE Journal of Oceanic Engineering*. https://doi.org/10.1109/joe.2020.2998930
8. Walton, C., Kaminer, I., Dobrokhodov, V., & Jones, K. D. (2018). Alternate Strategies for Optimal Unmanned Aerial Vehicle Thermaling. *Journal of Aircraft*, *55*(6), 2347-2356. https://doi.org/10.2514/1.c035018

9. Walton, C., Lambrianides, P., Kaminer, I., Royset, J., & Gong, Q. (2018). Optimal motion planning in rapid-fire combat situations with attacker uncertainty. *Naval Research Logistics (NRL)*, *65*(2), 101-119. https://doi.org/10.1002/nav.21790
10. Cichella, V., Kaminer, I., Walton, C., & Hovakimyan, N. (2017). Optimal motion planning for differentially flat systems using Bernstein approximation. *IEEE Control Systems Letters*, *2*(1), 181-186. https://doi.org/10.1109/lcsys.2017.2778313
11. Phelps, C., Gong, Q., Royset, J. O., Walton, C., & Kaminer, I. (2014). Consistent approximation of a nonlinear optimal control problem with uncertain parameters. *Automatica*, *50*(12), 2987-2997. https://doi.org/10.1016/j.automatica.2014.10.025

(b) Conference Papers (Total: 13)

1. Claire Walton, Abe Clark, Theodoros Tsatsanifos, Isaac Kaminer, and Qi Gong. Modeling and control of large-scale adversarial swarm engagements. In 2021 IEEE 60th Conference on Decision and Control (CDC), 2021. Accepted for publication.
2. Sean P Kragelund, Claire L Walton, Isaac I Kaminer, and Vladimir N Dobrokhodov. Optimal control as a tool for solving sonar design, resource allocation, and planning problems in search applications. IFAC-PapersOnLine, 53(2):15412-15419, 2020. https://doi.org/10.1016/j.ifacol.2020.12.2362
3. Vladimir N Dobrokhodov, Claire Walton, Isaac I Kaminer, and Kevin D Jones. Energy-optimal guidance of hybrid ultra-long endurance uav. IFAC-PapersOnLine, 53(2):15639-15646, 2020. https://doi.org/10.1016/j.ifacol.2020.12.2500
4. Dobrokhodov, V., Jones, K. D., Walton, C., & Kaminer, I. I. (2020). Achievable Endurance of Hybrid UAV Operating in Time-Varying Energy Fields. In *AIAA Scitech 2020 Forum* (p. 2197). https://doi.org/10.2514/6.2020-2197
5. Dobrokhodov, V., Jones, K. D., Walton, C., & Kaminer, I. I. (2020). Energy-optimal Trajectory Planning of Hybrid Ultra-Long Endurance UAV in Time-Varying Energy Fields. In *AIAA Scitech 2020 Forum* (p. 2299). https://doi.org/10.2514/6.2020-2299
6. Cichella, V., Kaminer, I., Walton, C., Hovakimyan, N., & Pascoal, A. M. (2019, December). Consistent approximation of optimal control problems using Bernstein polynomials. In *2019 IEEE 58th Conference on Decision and Control (CDC)* (pp. 4292-4297). IEEE. https://doi.org/10.1109/cdc40024.2019.9029677
7. Park, H., Gong, Q., Kang, W., Walton, C., & Kaminer, I. (2018, June). Observability Analysis of an Adversarial Swarm's Cooperation Strategy. In *2018 IEEE 14th International Conference on Control and Automation (ICCA)* (pp. 992-997). IEEE. https://doi.org/10.1109/icca.2018.8444217
8. Walton, C., Kaminer, I., Dobrokhodov, V., & Jones, K. D. (2017, December). New insights into autonomous soaring. In *2017 IEEE 56th Annual Conference on Decision and Control (CDC)* (pp. 2059-2064). IEEE. https://doi.org/10.1109/cdc.2017.8263950
9. Walton, C., Kragelund, S., & Kaminer, I. (2017, June). Issues in multi-agent search: False positives and Bayesian map updates. In *OCEANS 2017-Aberdeen* (pp. 1-4). IEEE. https://doi.org/10.1109/oceanse.2017.8084816
10. Walton, C., Phelps, C., Gong, Q., & Kaminer, I. (2016). A numerical algorithm for optimal control of systems with parameter uncertainty. *IFAC-PapersOnLine*, *49*(18), 468-475. https://doi.org/10.1016/j.ifacol.2016.10.209

11. Kragelund, S., Walton, C., & Kaminer, I. (2016, September). Sensor-based motion planning for autonomous vehicle teams. In *OCEANS 2016 MTS/IEEE Monterey* (pp. 1-8). IEEE. https://doi.org/10.1109/oceans.2016.7761183
12. Walton, C., Kragelund, S., & Kaminer, I. (2016, September). The application of 'optimal search' to marine mapping. In *OCEANS 2016 MTS/IEEE Monterey* (pp. 1-6). IEEE. https://doi.org/10.1109/oceans.2016.7761182
13. Walton, C. L., Gong, Q., Kaminer, I., & Royset, J. O. (2014). Optimal motion planning for searching for uncertain targets. *IFAC Proceedings Volumes*, *47*(3), 8977-8982. https://doi.org/10.3182/20140824-6-za-1003.01388

Student Advising

(a) Doctoral Dissertations

1. Dissertation Committee Member for Ann Sebastian, advanced to candidacy, May 2021, UTSA.
2. Dissertation Committee Member for Ramsey Shadfan, advanced to candidacy, August 2021, UTSA

(b) M.S. Theses and MS Project Directed (Chair of Thesis/Project Committee)

1. Thesis Advisor for Lucas Humpal, MS Thesis: "*Intelligent Antenna Control for Dynamic Environments.*" (completed April 2021), UTSA. **Placement: Southwest Research Institute.**

Services to University, College and Department

College of Engineering

2020-2021 Committee Member, College Inclusive Excellence Committee

Department

2020-2021 Committee Chair, Mathematics Department Website Committee

Professional Development Activities

2021	How to Pursue Funding from Mission Agencies (DOE,DoD, NOAA, NASA andother agencies), UTSA VPREDKE Workshop on agency
2021	Developing Outreach & Broader Impacts Components for NSF Proposals, UTSA VPREDKE Workshop
2020	Model for Success: Proposal Development Strategy, UTSA.
2020	Crafting Your Research Pitch, UTSA VPREDKE Workshop
2020	ORS Workshop: Funding Search Tools & Tips, UTSA Office of ResearchSupport. workshop on searching for funding
2020	REDKE/ORS Workshop: Writing Winning Grant Proposals, UTSA Workshop