

Stanford



Mac Schwager

Associate Professor of Aeronautics and Astronautics

Bio

ACADEMIC APPOINTMENTS

- Associate Professor, Aeronautics and Astronautics

ADMINISTRATIVE APPOINTMENTS

- Assistant Professor, Boston University, (2012-2015)
- Postdoctoral Researcher, University of Pennsylvania, (2010-2012)
- Postdoctoral Researcher, MIT, (2009-2011)
- Automation Engineer, Applied Materials, Inc, (2000-2002)

HONORS AND AWARDS

- Best Paper Finalist, International Conference on Robotics and Automation (ICRA) (2016)
- King-Sun Fu Memorial Best Paper Award, IEEE Transactions on Robotics (2016)
- Early Career Research Excellence Award, Boston University College of Engineering (2015)
- CAREER Award, NSF (2014)
- Best Paper Finalist, International Conference on Robotics and Automation (ICRA) (2011)
- Best Paper Award, Conference on the Simulation of Adaptive Behavior (SAB) (2008)
- Best Paper Finalist, International Conference on Robotics and Automation (ICRA) (2008)

PROFESSIONAL EDUCATION

- PhD, MIT , Mechanical Engineering (2009)
- MS, MIT , Mechanical Engineering (2005)
- BS, Stanford , Mechanical Engineering (2000)

LINKS

- Lab Website: <https://msl.stanford.edu/>
- Personal Website: <http://web.stanford.edu/~schwager/>

Teaching

COURSES

2021-22

- Advanced Feedback Control Design: AA 212 (Aut)
- Multi-Robot Control and Distributed Optimization: AA 277 (Win)
- State Estimation and Filtering for Robotic Perception: AA 273 (Spr)

2020-21

- Advanced Feedback Control Design: AA 212 (Aut)
- Multi-Robot Control and Distributed Optimization: AA 277 (Win)
- State Estimation and Filtering for Robotic Perception: AA 273 (Spr)

2019-20

- Multi-robot Control, Communication, and Sensing: AA 277 (Win)
- State Estimation and Filtering for Aerospace Systems: AA 273 (Spr)

2018-19

- Advanced Feedback Control Design: AA 212 (Aut)
- Multi-robot Control, Communication, and Sensing: AA 277 (Win)
- State Estimation and Filtering for Aerospace Systems: AA 273 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Adam Caccavale, Tommaso Guffanti, Taylor Howell, Masha Itkina, Soyeon Jung, Sydney Katz, Bernard Lange, Jeff Park, Marsie Peterson, Aliyah Smith, Nathan Stacey, David Stonestrom

Postdoctoral Faculty Sponsor

Roya Fallah Firoozi

Doctoral Dissertation Advisor (AC)

Adam Caccavale, Preston Culbertson, Trevor Halsted, Jun En Low, Keiko Nagami, Olaoluwa Shorinwa, Gadi Sznaier Camps, Joe Vincent, Patrick Washington, Javier Yu

Master's Program Advisor

Samuel Akinwande, Timothy Chen, Evan Hedding, Bernard Lange, Greg Lund, Aaron Wong, Javier Yu

Doctoral (Program)

Claire Chen

Publications

PUBLICATIONS

- **An untethered isoperimetric soft robot** *SCIENCE ROBOTICS*
Usevitch, N. S., Hammond, Z. M., Schwager, M., Okamura, A. M., Hawkes, E. W., Follmer, S.
2020; 5 (40)
- **Multi-agent sensitivity enhanced iterative best response: A real-time game theoretic planner for drone racing in 3D environments** *ROBOTICS AND AUTONOMOUS SYSTEMS*
Wang, Z., Taubner, T., Schwager, M.
2020; 125
- **GRAPE: Geometric Risk-Aware Pursuit-Evasion** *ROBOTICS AND AUTONOMOUS SYSTEMS*
Shah, K., Schwager, M.

2019; 121

- **Tracking a Markov Target in a Discrete Environment With Multiple Sensors** *IEEE TRANSACTIONS ON AUTOMATIC CONTROL*
Leahy, K., Schwager, M.
2019; 64 (6): 2396–2411
- **Distributed multi-robot formation control in dynamic environments** *AUTONOMOUS ROBOTS*
Alonso-Mora, J., Montijano, E., Nageli, T., Hilliges, O., Schwager, M., Rus, D.
2019; 43 (5): 1079–1100
- **Control in belief space with temporal logic specifications using vision-based localization** *INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH*
Leahy, K., Cristofalo, E., Vasile, C., Jones, A., Montijano, E., Schwager, M., Belta, C.
2019; 38 (6): 702–22
- **Translational and Rotational Invariance in Networked Dynamical Systems** *IEEE TRANSACTIONS ON CONTROL OF NETWORK SYSTEMS*
Vasile, C., Schwager, M., Belta, C.
2018; 5 (3): 822–32
- **Agile Coordination and Assistive Collision Avoidance for Quadrotor Swarms Using Virtual Structures** *IEEE TRANSACTIONS ON ROBOTICS*
Zhou, D., Wang, Z., Schwager, M.
2018; 34 (4): 916–23
- **Controlling Noncooperative Herds with Robotic Herders** *IEEE TRANSACTIONS ON ROBOTICS*
Pierson, A., Schwager, M.
2018; 34 (2): 517–25
- **Distributed Deep Reinforcement Learning for Fighting Forest Fires with a Network of Aerial Robots**
Haksar, R. N., Schwager, M., Kosecka, J., Maciejewski, A. A., Okamura, A., Bicchi, A., Stachniss, C., Song, D. Z., Lee, D. H., Chaumette, F., Ding, H., Li, J. S., Wen, et al
IEEE.2018: 1067–74
- **Controlling Large, Graph-based MDPs with Global Control Capacity Constraints: An Approximate LP Solution**
Haksar, R. N., Schwager, M., IEEE
IEEE.2018: 35–42
- **Active Motion-Based Communication for Robots with Monocular Vision**
Nishimura, H., Schwager, M., IEEE
IEEE COMPUTER SOC.2018: 2948–55
- **Decentralized Adaptive Control for Collaborative Manipulation**
Culbertson, P., Schwager, M., IEEE
IEEE COMPUTER SOC.2018: 278–85
- **Safe Distributed Lane Change Maneuvers for Multiple Autonomous Vehicles Using Buffered Input Cells**
Wang, M., Wang, Z., Paudel, S., Schwager, M., IEEE
IEEE COMPUTER SOC.2018: 4678–84
- **Cooperative Object Transport in 3D with Multiple Quadrotors using No Peer Communication**
Wang, Z., Singh, S., Pavone, M., Schwager, M., IEEE
IEEE COMPUTER SOC.2018: 1064–71
- **Wireframe Mapping for Resource-Constrained Robots**
Caccavale, A., Schwager, M., Kosecka, J., Maciejewski, A. A., Okamura, A., Bicchi, A., Stachniss, C., Song, D. Z., Lee, D. H., Chaumette, F., Ding, H., Li, J. S., Wen, et al
IEEE.2018: 8658–65
- **Adapting to sensing and actuation variations in multi-robot coverage** *INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH*
Pierson, A., Figueiredo, L. C., Pimenta, L. C., Schwager, M.
2017; 36 (3): 337-354
- **Localization of a Ground Robot by Aerial Robots for GPS-Deprived Control with Temporal Logic Constraints**

Cristofalo, E., Leahy, K., Vasile, C., Montijano, E., Schwager, M., Belta, C., Kulis, D., Nakamura, Y., Khatib, O., Venture, G.
SPRINGER INTERNATIONAL PUBLISHING AG.2017: 525–37

- **Distributed Multi-Robot Localization from Acoustic Pulses Using Euclidean Distance Geometry**
Halsted, T., Schwager, M., Giordano, P. R.
IEEE.2017
- **Learning a Dynamical System Model for a Spatiotemporal Field Using a Mobile Sensing Robot**
Lan, X., Schwager, M., IEEE
IEEE.2017: 170–75
- **Force-Amplifying N-robot Transport System (Force-ANTS) for cooperative planar manipulation without communication** *INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH*
Wang, Z., Schwager, M.
2016; 35 (13): 1564-1586
- **Rapidly Exploring Random Cycles: Persistent Estimation of Spatiotemporal Fields With Multiple Sensing Robots** *IEEE TRANSACTIONS ON ROBOTICS*
Lan, X., Schwager, M.
2016; 32 (5): 1230-1244
- **Correlated Orienteering Problem and its Application to Persistent Monitoring Tasks** *IEEE TRANSACTIONS ON ROBOTICS*
Yu, J., Schwager, M., Rus, D.
2016; 32 (5): 1106-1118
- **Vision-Based Distributed Formation Control Without an External Positioning System** *IEEE TRANSACTIONS ON ROBOTICS*
Montijano, E., Cristofalo, E., Zhou, D., Schwager, M., Sagues, C.
2016; 32 (2): 339-351