

# Stanford

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## Mac Schwager

Assistant Professor of Aeronautics and Astronautics

### Bio

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#### ACADEMIC APPOINTMENTS

- Assistant 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

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#### COURSES

2020-21

- Advanced Feedback Control Design: AA 212 (Aut)
- Aircraft Design: AA 146A (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)

#### 2017-18

- 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)

Raunak Bhattacharyya, Andrew Bylard, Michelle Chernick, Duncan Eddy, Vince Giraldo, Zack Hammond, Boris Ivanovic, Karen Leung, Corinne Lippe, Aditya Mahajan, Jeff Park, Nathan Stacey, David Stonestrom, Adam Wiktor

#### Postdoctoral Faculty Sponsor

David Fridovich-Keil

#### Doctoral Dissertation Advisor (AC)

Adam Caccavale, Preston Culbertson, Ravi Haksar, Trevor Halsted, Jun En Low, Haruki Nishimura, Kunal Shah, Olaoluwa Shorinwa, Mingyu Wang, Patrick Washington

#### Master's Program Advisor

Samuel Akinwande, Timothy Chen, Racheal Erhard, KJ Hardrict, Bernard Lange, Alexander Maynard, Aliyah Smith, Karthik Srivatsan, Gadi Sznaier Camps, Javier Yu, Remy Zawislak

#### Doctoral (Program)

Claire Chen

### Publications

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#### 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*

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- 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., Kulic, 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., Saguees, C.  
2016; 32 (2): 339-351