# M. ANI HSIEH

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Mechanical Engineering and Mechanics
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## EDUCATION

Ph.D. Mechanical Engineering *2007*
Thesis: *Motion Control Strategies for Networked Robot Teams in Environments with Obstacles*
University of Pennsylvania, Philadelphia, PA – Advised by Vijay Kumar

M.Sc. Mechanical Engineering *2005*
University of Pennsylvania, Philadelphia, PA

B.S. Engineering *1999*
Swarthmore College, Swarthmore, PA

B.A. Economics *1999*
Swarthmore College, Swarthmore, PA

## PROFESSIONAL EXPERIENCE

| | |
|---|---|
| 2008-present | Assistant Professor, Department of Mechanical Engineering and Mechanics, Drexel University |
| 2007-2008 | Visiting Assistant Professor, Engineering Department, Swarthmore College |
| 2002-2007 | Research Assistant, Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania |
| 1999-2002 | Engineer, R. W. Beck |

## AWARDS, HONORS, AND FELLOWSHIPS

- 2013 National Science Foundation CAREER Award for proposal entitled *"CAREER: A New Paradigm in Control and Coordination of Robot Teams in Geophysical Flows"*
- 2012 Office of Naval Research Young Investigator Award for proposal entitled *"Collaborative Robots in Geophysical Flows: Understanding How Local Measurements Imply Global Structures"*
- ONR Summer Research Faculty, Naval Research Laboratory, June-Sept 2011
- Best Paper Award, the 10th International Symposium on Distributed Autonomous Robotics Systems (DARS 2010), Lausanne, Switzerland, November 2010
- Research Co-op Award, Drexel University, 2010
- The John A. Goff Prize, University of Pennsylvania, 2007
- Mechanical Engineering Teaching Award, University of Pennsylvania (2003-2004)

## PROFESSIONAL ACTIVITIES

Professional Society Membership
- Institute of Electrical and Electronics Engineers (IEEE)
- Robotics and Automation Society (RAS)

Editorship
- Associate Editor, *Transactions on Automation Science and Engineering*, 2012 present
- Guest Editor, *Journal of Field Robotics Special Issue: Special Issue on Multi Autonomous Ground-robotic International Challenge (MAGIC)*, Vol 29, Issue 5, September/October 2012
- Associate Editor, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2009-2011

- Associate Editor, *14th IASTED International Conference on Robotics and Applications*, Cambridge, MA USA, 2009

Conference and Workshop Organization

- Program Chair, *11th Int. Symp. on Distributed Autonomous Robotics Systems (DARS)*, Baltimore, MD USA, 2012
- Poster Session Chair, *Performance Metrics for Intelligent Systems Workshop (PerMIS)*, College Park, MD USA, 2012
- Program Committee, *Performance Metrics for Intelligent Systems Workshop (PerMIS)*, College Park, MD USA, 2012
- Program Committee, *8th International Conference on Swarm Intelligence (ANTS)*, Brussels, Belgium, 2012
- Travel Award Committee, *IEEE International Conference on Robotics and Automation*, 2010-2011
- Travel Award Committee, *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2010-2012
- Program Committee, *12th Towards Autonomous Robotics Systems Conference (TAROS)*, Sheffield, UK, 2011
- Program Committee, *8th International Conference on Informatics in Control, Automation and Robotics (ICINCO)*, Noordwijkerhout, The Netherlands, 2011
- Program Committee, *7th International Conference on Swarm Intelligence (ANTS)*, Brussels, Belgium, 2010
- Technical Co-Chair, *10th International Symposium on Distributed Autonomous Robotics Systems (DARS)*, Lausanne, Switzerland, 2010
- Publication Co-Chair, *IEEE International Conference on Robotics and Automation (ICRA)*, Anchorage, AK USA, 2010
- Registration Chair, *IEEE International Conference on Robotics and Automation (ICRA)*, Pasadena, CA USA, 2008

Reviewer

- *National Science Foundation*, Fall 2008, Winter 2009, Spring 2009, Winter 2013
- **Journals:** IEEE Transactions on Robotics (TRO), IEEE Transactions on Automation Science and Engineering (T-ASE), IEEE Transactions on Automatic Control (TAC), International Journal of Robotics Research (IJRR), Swarms Intelligence (SI), Journal of Field Robotics (JFR), Robotica, Physica A, Asian Journal of Control, and Journal of Intelligent Service Robotics (JIST).
- **Conferences and Workshops:** IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Robotics: Science and Systems (RSS), International Symposium on Distributed Autonomous Robotics Systems (DARS), IEEE Conference on Decision and Control (CDC), and IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR).

**INVITED LECTURES, SEMINARS, AND COLLOQUIA**

- University of Maryland, College Park, MD USA, Dec 14, 2012
- Harvard University, Boston, MA USA, Oct 25, 2012
- University of Minnesota, Minneapolis, MN USA, Oct 15, 2012
- University of Michigan, Ann Arbor, MI USA, Oct 2, 2012
- Montclair State University, Montclair, NJ USA, Apr 11, 2012
- Naval Research Laboratory, Washington, DC USA, Apr 9, 2012
- École Polytechnique Fédéral de Lausanne (EPFL), Lausanne, Switzerland, May 8, 2012
- University of Southern California, Los Angeles, CA USA, Mar 29, 2012
- AAAI Symposium AI, The Fundamental Social Aggregation Challenge, and the Autonomy of Hybrid Agent Groups, Palo Alto, CA USA, Mar 27, 2012
- Naval Postgraduate School, Monterey, CA USA, Mar 24, 2012
- College of New Jersey, Ewing, NJ USA, Nov 11, 2011
- Rutgers University, New Brunswick, NJ USA, Nov 2, 2011
- Zif Workshop on Swarm Intelligence and Critical Behavior, Bielefeld, Germany, Mar 22-24, 2011
- University of California Santa Cruz (UCSC), Santa Cruz, CA USA, Feb 28, 2011
- Electronics and Telecommunications Research Institute (ETRI), Daejeon, Korea, Feb. 22, 2011
- University of West Virginia (UWV), Morgantown, WV USA, Oct 21, 2010
- Stevens Institute of Technology, Hoboken, NJ USA, Mar 10, 2010
- National Institute of Standards and Technology (NIST), Washington, DC USA, Jun 29, 2010
- Temple University, Philadelphia, PA USA, Oct 22, 2009
- Villanova University, Villanova, PA USA, Jan 25, 2008

**TEACHING**

Courses Developed and Taught at Drexel University

| | |
|---|---|
| MEM355 | Performance Enhancement of Dynamic Systems (S'2009, F'2010, S'2011) |
| MEM456/380 | Robotics II/Mobile Robots II/Applied Autonomous Robots II (W'2009, W'2010, W'2012, W'2013) |
| MEM455/380 | Introduction to Robotics/Applied Autonomous Robots I (F'2008, F'2009, S'2010, W'2011, F'2012) |

Courses Developed and Taught at Swarthmore College

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|---|---|
| E058 | Control Theory and Design(S'2008) |
| E028 | Mobile Robotics (S'2008) |
| E091 | Dynamics (F'2007) |
| E015 | Fundamentals of Digital Systems Laboratory (F'2007) |

**MENTORING**

Doctoral Students

1. Dennis Larkin, Ph.D., Estimated, Jun 2017
2. Matthew Michini, Ph.D., Estimated, Jun 2017
3. Kenneth Mallory, Ph.D., Estimated, Jun 2016
4. James Worcester, Ph.D., Estimated, Jun 2014
5. T. William Mather, Ph.D., *Ensemble Control Strategies for Task Assignment for Robot Ensembles*, Estimated, Mar 2013

B.S./M.S. and Masters Students

1. T. James Milligan, B.S./M.S., Estimated, Jun 2013
2. Joshua Rogoff, B.S./M.S., *Distributed Assembly Strategies for Teams of Autonomous Robots*, Jun 2011

Doctoral Student Committee Membership

Eric Peterson (MEM, Ph.D., Anticipated 2013)
Daniel Lofaro (ECE, Ph.D., Anticipated 2013)
Linge Bai (CS, Ph.D., Anticipated 2013)
Youngbum Jun (MEM, Ph.D., Anticipated 2013)
Robert Ellenberg (MEM, Ph.D., Anticipated 2013)
Keith Sevcik (MEM, Ph.D. 2009)
James Hing (MEM, Ph.D. 2009)
Edward Steager (MEM, Ph.D. 2009)
Kyle Usbe (CS, M.S. 2009)

External Examination Committee

1. Grégory Mermoud, Ph.D., *Design, Modeling and Optimization of Stochastic Reactive Distributed Robotic Systems*, École Polytechnique Fédéral de Lausanne (EPFL), (May 2012)
2. Ke Xu, Ph.D., *Integrating Centralized and Decentralized Approaches for Multi-Robot Coordination*, Rutgers University, New Brunswick, NJ USA (May 2010)

Undergraduate Students

- **Senior Design Teams:**

| | |
|---|---|
| 2013 | Devashish Bhargava (MEM), Zhijian Liang (MEM), Christine Nolan (MEM), Wei Yi (ECE), Yongping Zhou (MEM) |
| 2013 | Alicia Andrescavage (MEM), Joseph Boales (MEM), Carol Engel (MEM), Michael Oake (MEM) |
| 2011 | Robert DeRose (ECE), Peterson Fortune (MEM), Lamine Kone (ECE), Jamal Morris (MEM) |
| 2010 | Christopher Berry (ECE), Theodore Bieniosek (MEM), Houstin Lichtenwalner (ECE), Derek Mitchell (MEM) |
| 2009 | Jason Czop (MEM), Jeff Grabner (ECE), Glenn Gilroy (ECE), Matthew Minnick (MEM), Ansar Tavir (ECE) |

- **Freshmen Design:**

| | |
|---|---|
| 2012 | Justin Agren, Stephen Calabro, Jared Pagats, Zachary Palanker |
| 2012 | Amanda Fowler, Daniel Lamando, Daniel S. Lewis, Nathan Massouda, Sameer Patel |
| 2011 | Christian Guzman, Eric Angell, Cody Maust, Melissa Bloecker, Mike Setaro |
| 2011 | Ian Adam, Zain Abdul Wahid, Joe Laschenski, Mike Lucas |

- **Undergraduate Research:** Matthew Annen (MEM Hess Scholar 2010), Michael Heffner (MEM Hess Scholar 2010), James Milligan (MEM Hess Scholar 2010-2012), Mickey Whitzer (MEM Hess Scholar 2010), Joshua Rogoff (MEM Hess Scholar 2009-2011), Theodore Bienosek (MEM Hess Scholar, 2008), Nicholas Kitten (2008)
- **Research Co-op:** Christopher Braun (MEM 2010), David Kumpf (MEM 2012)
- **REU and Summer Research:** Malcom Augat (Swarthmore College, 2009), Kevin Pastore (Worcester Polytechnique Institute, 2010), Seth Foster (Swarthmore College, 2012)

**FUNDED RESEARCH GRANTS**

1. Office of Naval Research, Young Investigator Program, *Collaborative Robots in Geophysical Flows: Understanding How Local Measurements Imply Global Structures*, PI, 09/01/2012-08/31/2015.
2. National Science Foundation, *Student Travel for PerMIS2012*, PI, 04/01/2012-03/31/2013.
3. National Science Foundation, *CRI II-NEW: MM-SISTR - Infrastructure for Enabling Mobile-Manipulation Unmanned Aerial Vehicle (MM-UAV) Research and Design*, co-PI [w/ Paul Oh (PI), James Tangorra, and Jin Kang], 07/01/2012-06/30/2015.
4. National Science Foundation, *Collaborative Research: International: US-Brazil Multi-Robot Systems for Large Scale Cooperative Tasks*, PI [w/ Rafael Fierro], 09/15/2011-09/14/2014.
5. National Science Foundation, *EAGER: Ensemble Design of Resource-Aware Control Strategies for Multi-Agent Robotic Systems*, PI, 09/15/2011-03/31/2013.
6. National Science Foundation, *MRI-R2: Development of Common Platform for Unifying Humanoids Research*, Senior Personnel [w/ Youngmoo Kim (PI), Stefan Schaal, Yury Gogotsi, William Regli, Dennis Hong], 07/01/2010-06/30/2015.
7. Korean Ministry of Knowledge, via ETRI, *Probabilistic Task Assignment in Real World Environments*, PI at Drexel [w/ Young-Jo Cho (ETRI) and Nak Young Chong (JAIST)], 04/01/2011-03/31/2015.
8. Mathworks, Inc., *Integration of High Fidelity 3-D Simulation Environments for Robotics Education*, PI, 07/01/2010-04/30/2012.

**PUBLICATIONS**

Refereed Journal Publications

J1. J. Worcester, R. Lakaemper, and **M. A. Hsieh**. "Distributed Assembly with Online Workload Balancing and Visual Error Detection and Correction," *International Journal of Robotics Research*, Under Review.

J2. T. W. Mather and **M. A. Hsieh**. "Macroscopic Modeling of Stochastic Deployment Policies with Time Delays for Robot Ensembles," *International Journal of Robotics Research: Special Issue on Stochasticity in Robotics & Biological Systems*, Part 1, Vol. 30, No. 5, Apr 2011.

J3. S. Berman, A. Halasz, **M. A. Hsieh**, V. Kumar. "Optimal Stochastic Policies for Task Allocation in Swarms of Robots," Vol 25, Issue 4, *Transactions on Robotics*, pp. 927-937, 2009.

J4. J. Derenick, J. Spletzer and **M. A. Hsieh**. "An Optimal Approach to Collaborative Target Tracking with Performance Guarantees," Vol. 56, No. 1-2, Journal of Intelligent and Robotic Systems, pp 47-67, 2009.

J5. **M. A. Hsieh**, A. Halasz, S. Berman, and V. Kumar. "Biologically Inspired Redistribution of a Swarm of Robots Among Multiple Sites," *Swarm Intelligence*, Vol. 2, No. 2-4, Dec 2008, pp 121-141.

J6. **M. A. Hsieh**, V. Kumar and L. Chaimowicz. "Decentralized Controllers for Shape Generation with Robotic Swarms," *Robotica*, Vol. 26, Issue 5, Sept 2008, pp 691-701.

J7. **M. A. Hsieh**, A. Cowley, V. Kumar and C.J. Taylor. "Maintaining Network Connectivity and Performance in Robot Teams," *Journal of Field Robotics*, Vol. 26, Issue 1-2, Jan 2008, pp 111-131.

J8. **M. A. Hsieh**, L. Chaimowicz, A. Cowley, B. Grocholsky, J. F. Keller, V. Kumar, C. J. Taylor, Y. Endo, R. C. Arkin, B. Jung, D. F. Wolf, G. Sukhatme, and D. C. MacKenzie. "Adaptive Teams of Autonomous Aerial and Ground Robots for Situational Awareness," *Journal of Field Robotics*, Vol. 24, Issue 11-12, Nov 2007, pp 991-1014.

Book Chapter

B1. M. A. Hsieh and T. W. Mather. "Robustness in the Presence of Task Differentiation in Robot Ensembles," in *Redundancy in Robot Manipulators and Multi-Robot Systems*, eds. D. Milutinovic and J. Rosen, Springer Berlin Heidelberg 2013.

B2. S. Berman, A. Halasz, and **M. A. Hsieh**. "Ant-Inspired Allocation: Top-Down Controller Design for Distributing a Robot Swarm among Multiple Tasks," *Bio-inspired Computing and Communication Networks*, Eds. Y. Xiao and F. Hu, Auerbach Publications, CRC Press 2010.

Refereed Conference Papers

C1. J. Worcester and **M. A. Hsieh**, "Task Partitioning via Ant Colony Optimization for Distributed Assembly," in the *Proc. of the 8th International Conference on Swarm Intelligence (ANTS 2012)*, Sep, 2012, Brussels, Belgium.

C2. T. W. Mather and **M. A. Hsieh**, "Ensemble Modeling and Control for Congestion Management in Automated Warehouses," **(Finalist, Best Student Paper)**, in the *Proc. of the IEEE International Conference on Automation Science and Engineering (CASE 2012)*, Aug 2012, Seoul, Korea.

C3. P. Abichandani, K. Mallory, and **M. A. Hsieh**, "Experimental Multi-Vehicle Path Coordination under Communication Connectivity Constraints," in the *Proc. of the 13th International Symposium on Experimental Robotics (ISER2012)*, Jun 2012, Quebec City, Quebec, Canada.

C4. J. Worcester, R. Lakaemper, and **M. A. Hsieh**, "3-Dimensional Tiling for Distributed Assembly by Robot Teams," in the *Proc. of the 13th International Symposium on Experimental Robotics (ISER2012)*, Jun 2012, Quebec City, Quebec, Canada.

C5. *M. A. Hsieh*, E. Forgoston, T. W. Mather, and I. B. Schwartz, "Robotic Manifold Tracking of Coherent Structures in Flows," in the *Proc. of the IEEE International Conference on Robotics and Automation (ICRA2012)*, May 2012, St. Paul, MN, USA.

C6. T. W. Mather and **M. A. Hsieh**. "Ensemble Synthesis of Distributed Control and Communication," in the *Proc. of the IEEE International Conference on Robotics and Automation (ICRA2012)*, May 2012, St. Paul, MN, USA.

C7. J. Worcester, J. Rogoff, and **M. A. Hsieh**. "Constrained Task Partitioning for Distributed Assembly", in the *Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2011)*, Sep 2011, San Francisco, CA, USA.

C8. T. W. Mather and **M. A. Hsieh**. "Distributed Robot Ensemble Control for Deployment to Multiple Sites," in the *Proc. of the 2011 Robotics: Science and Systems Conference*, Jun-Jul 2011, Los Angeles, CA USA.

C9. T. W. Mather, C. Braun, and **M. A. Hsieh**. "Distributed Filtering for Time-Delayed Deployment to Multi-Sites," **Best Paper**, in the *Proc. of the 10th International Symposium on Distributed Autonomous Robotics Systems (DARS 2010)*, Nov 2010, Lausanne, Switzerland.

C10. **M. A. Hsieh** and J. Rogoff. "Complexity Measures for Distributed Assembly Tasks," in the *Proc. of the 2010 Performance Metrics for Intelligent Systems Workshop (PerMIS10)*, Sep 2010, Baltimore, MD, USA.

C11. T. W. Mather, **M. A. Hsieh**, and E. Frazzoli. "Towards Dynamic Team Formation for Robot Ensembles," in the *Proc. of the IEEE International Conference on Robotics and Automation (ICRA2010)*, May 2010, Anchorage, AK, USA.

C12. A. Cowley, **M. A. Hsieh**, and C. J. Taylor. "Development of Top-Down Analysis of Distributed Assembly Tasks," in the *Proc. of the 2009 Performance Metrics for Intelligent Systems Workshop (PerMIS09)*, Sep 2009, Washington, D.C., USA.

C13. **M. A. Hsieh**, A. Halasz, E. D. Cubuk, S. Schoenholz, and A. Martinoli. "Specialization as an Optimal Strategy Under Varying External Conditions," in the *Proc. of the IEEE International Conference on Robotics and Automation (ICRA'09)*, May 2009, Kobe, Japan.

C14. S. Berman, A. Halasz, **M. A. Hsieh**, and V. Kumar. "Navigation-Based Optimization of Stochastic Deployment Strategies for a Robot Swarm to Multiple Sites," in the *Proc. of the 47th IEEE Conference on Decision and Control (CDC'08)*, Dec 2008, Cancun, Mexico, pp. 4376 4381.

C15. J. Fink, **M. A. Hsieh**, and V. Kumar. "Multi-Robot Manipulation via Caging in Environments with Obstacles," in the *Proc. of the IEEE International Conference on Robotics and Automation (ICRA08)*, May 2008, Pasedena, CA, USA, pp. 1471 - 1476.

C16. J. Derenick, J. Spletzer, and **M. A. Hsieh**. "A Graph Theoretic Approach to Optimal Target Tracking for Mobile Robot Teams," in the *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2007)*, Oct-Nov 2007, San Diego, CA, USA, pp. 3422 - 3428.

C17. A. Halasz, **M. A. Hsieh**, S. Berman, and V. Kumar. "Dynamic Redistribution of a Swarm of Robots Among Multiple Sites," in the *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2007)*, Oct-Nov 2007, San Diego, CA, USA, pp. 2320-2325.

C18. **M. A. Hsieh**, S. Loizou and V. Kumar. "Stabilization of Multiple Robots on Stable Orbits via Local Sensing", in the *Proc. IEEE International Conference on Robotics and Automation (ICRA2007)*, Apr 2007, Rome, Italy, pp. 2312 - 2317.

C19. **M. A. Hsieh** and V. Kumar. "Pattern Generation with Multiple Robots", in the *Proc. IEEE International Conference on Robotics and Automation (ICRA'06)*, May 2006, Orlando, FL, USA, pp. 2442 - 2447.

C20. **M. A. Hsieh**, A. Cowley, V. Kumar, and C.J. Taylor. "Towards the Deployment of a Mobile Robot Network with End-to-End Performance Guarantees", in the *Proc. IEEE International Conference on Robotics and Automation (ICRA'06)*, Apr-May 2006, Orlando, FL, USA, pp. 2085 - 2090.

C21. L. Chaimowicz, A. Cowley, D. Gomez-Ibanez, B. Grocholsky, **M. A. Hsieh**, H. Hsu, J. F. Keller, V. Kumar, R. Swaminathan, and C. J. Taylor, "Deploying Air-Ground Multi-Robot Teams in Urban Environments", in the *Proc. of the 2005 International Workshop on Multi-Robot Systems*, Mar 2005, Washington DC, USA, pp. 223-234.

C22. **M. A. Hsieh**, P. Srivastava, V. Kumar and C.J. Taylor. "Composable Communication Constraint Based Control", in the *Proc. SPIE Optics East 2004*, October, 2004, Philadelphia, PA.

C23. **M. A. Hsieh**, V. Kumar and C.J. Taylor. "Constructing Radio Signal Strength Maps with Multiple Robots", in the *Proc. IEEE International Conference on Robotics and Automation (ICRA'04)*, Apr 2004, New Orleans, LA, USA, pp. 4184-4189.

C24. J. Derenick, J. Spletzer, and **M. A. Hsieh**. "A Graph Theoretic Approach to Optimal Target Tracking for Mobile Robot Teams," in the *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'07)*, Oct-Nov 2007, San Diego, CA, USA, pp. 3422 - 3428.

C25. A. Halasz, **M. A. Hsieh**, S. Berman, and V. Kumar. "Dynamic Redistribution of a Swarm of Robots Among Multiple Sites," in the *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'07)*, Oct-Nov 2007, San Diego, CA, USA, pp. 2320-2325.

C26. **M. A. Hsieh**, S. Loizou and V. Kumar. "Stabilization of Multiple Robots on Stable Orbits via Local Sensing", in the *Proc. IEEE International Conference on Robotics and Automation (ICRA'07)*, Apr 2007, Rome, Italy, pp. 2312 - 2317.

C27. **M. A. Hsieh** and V. Kumar. "Pattern Generation with Multiple Robots," in the *Proc. IEEE International Conference on Robotics and Automation (ICRA'06)*, May 2006, Orlando, FL, USA, pp. 2442 - 2447.

C28. **M. A. Hsieh**, A. Cowley, V. Kumar, and C.J. Taylor. "Towards the Deployment of a Mobile Robot Network with End-to-End Performance Guarantees," in the *Proc. IEEE International Conference on Robotics and Automation (ICRA'06)*, Apr-May 2006, Orlando, FL, USA, pp. 2085 - 2090.

C29. L. Chaimowicz, A. Cowley, D. Gomez-Ibanez, B. Grocholsky, **M. A. Hsieh**, H. Hsu, J. F. Keller, V. Kumar, R. Swaminathan, and C. J. Taylor, "Deploying Air-Ground Multi-Robot Teams in Urban Environments," in the *Proc. of the 2005 International Workshop on Multi-Robot Systems*, Mar 2005, Washington DC, USA, pp. 223-234.

C30. **M. A. Hsieh**, P. Srivastava, V. Kumar, and C.J. Taylor. "Composable Communication Constraint Based Control," in the *Proc. SPIE Optics East* 2004, Oct 2004, Philadelphia, PA.

C31. **M. A. Hsieh**, V. Kumar, and C.J. Taylor. "Constructing Radio Signal Strength Maps with Multiple Robots," in the *Proc. IEEE International Conference on Robotics and Automation (ICRA'04)*, Apr 2004, New Orleans, LA, USA, pp. 4184-4189.