

Jason R. Marden

Assistant Professor
Department of Electrical and Computer Engineering
University of California, Santa Barbara
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Area of Interest

Feedback control and systems theory. Game theoretic methods for coordination of large scale distributed systems. Application to distributed traffic routing, dynamic resource allocation, and sensor networks.

Education

- 2007 Doctor of Philosophy in Mechanical and Aerospace Engineering
 Dissertation: *Learning in Large-Scale Games and Cooperative Control*.
 University of California Los Angeles
 Advisor: Jeff S. Shamma
- 2004 Master of Science in Mechanical Engineering
 Thesis: *Coordination of Multiple Agents Using Neuro-Dynamic Programming*.
 University of California Los Angeles
- 2001 Bachelor of Science in Mechanical Engineering (Cum Laude)
 University of California Los Angeles

Academic Appointments

- 2015–present **Assistant Professor**. Department of Electrical and Computer Engineering, University of California, Santa Barbara.
- 2010–2015 **Assistant Professor**. Department of Electrical, Computer and Energy Engineering, University of Colorado at Boulder (on leave as of 8/2015).
- 2007–2009 **Junior Fellow**. Social and Information Sciences Laboratory, California Institute of Technology.
- 2006–2007 **Research Scientist**. Department of Electrical Engineering, University of Hawaii at Manoa.

Awards and Honors

- 2015 SIAG/CST Best SICON Paper Prize.
- 2015 Office of Naval Research Young Investigator Award.
- 2015 Outstanding Junior Faculty Award, University of Colorado.
- 2014 Career Award, National Science Foundation.
- 2013 Semi-Plenary speaker, American Control Conference.
- 2013 Dean's Faculty Fellowship, University of Colorado.
- 2012 Donald P. Eckman Award given by the American Automatic Control Council.
- 2012 Air Force Young Investigator Award.
- 2011 Best Student Paper Finalist (Advisor for Na Li), Conference on Decision and Control.
- 2009 Keynote Speaker, ALADDIN Game Theory Workshop, University of Bristol.

2007	Outstanding Graduating PhD Student in Mechanical Engineering, UCLA.
2007	Post-Doctoral Fellowship, Caltech. Social and Information Sciences Laboratory.
2001	Graduate Fellowship, UCLA. Department of Mechanical and Aerospace Engineering.
2001	Raytheon Excellent Achievement Award.

Funded Research Projects

1. “ONR YIP: Inherent Trade-offs in Multiagent Coordination” PI: Jason R. Marden, no Co-PIs, Office of Naval Research Young Investigator Award, 4/1/15–3/31/18, \$510,000.
2. “CU14-01 Information and Distributed Optimization,” PI: Jason R. Marden, Co-PIs Eric W. Frew, Industry Advisory Board for the Center for Unmanned Aircraft Systems (CUAS), 9/1/14–8/31/15, \$60,000.
3. “NSF CAREER: Game Theoretic Methods for Multiagent Coordination,” PI: Jason R. Marden, no Co-PIs, National Science Foundation, 4/1/14–3/31/18, \$400,000.
4. “CU13-06A Guidance and Control for a UAS Providing Communication Services,” PI: Eric Frew, Co-PIs Timothy Brown and Jason R. Marden, Industry Advisory Board for the Center for Unmanned Aircraft Systems (CUAS), 9/1/13–8/31/14, \$80,000.
5. “The Role of Information in Distributed Control,” PI: Jason R. Marden, no Co-PIs, Office of Naval Research, 4/1/12–3/31/15, \$510,000.
6. “AFOSR YIP: Game Engineering – A Multiagent Systems Perspective,” PI: Jason R. Marden, no Co-PIs, AFOSR Young Investigator Award, 7/1/12–6/31/15, \$382,000.
7. “An Innovative Approach to the Design and Control of Wind Farms,” PI: Jason R. Marden, Co-PI Lucy Y. Pao, Center for Research and Education in Wind (CREW), 6/1/11–5/31/12, \$25,000.
8. “Distributed learning and information dynamics in networked autonomous systems,” PI: Jason R. Marden, AFOSR/MURI, subcontract through Johns Hopkins, 6/1/10 – 9/30/11, \$75,846.

Book Chapters

1. J.R. Marden and J.S. Shamma, “Game Theory and Distributed Control,” *Handbook of Game Theory*, Volume IV, edited by Peyton Young and Shmuel Zamir, Elsevier Science, 2014.

Journal Publications

1. H. Borowski, J.R. Marden, and J.S. Shamma, “Learning Efficient Correlated Equilibrium,” *IEEE Transactions on Systems and Cybernetics*, 2015 (under review).
2. P.N. Brown and J.R. Marden, “Robust Taxation Mechanisms in Affine Congestion Games with Price-Sensitive Users,” *IEEE Transactions on Automatic Control*, 2015 (under review).
3. J.R. Marden, “The Role of Information in Multiagent Coordination,” *IEEE Transactions on Control of Networked Systems*, 2015 (under review).
4. J.R. Marden, “Selecting Efficient Correlated Equilibria Through Distributed Learning,” *Games and Economic Behavior*, 2015 (under review).
5. H. Borowski and J.R. Marden, “Fast Convergence in Semi-Anonymous Potential Games,” *IEEE Transactions on Control of Networked Systems*, 2015 (to appear).

6. P. Gebraad, F. W. Teeuwisse, J.W. van Wingerden, P.A. Fleming, S.D. Ruben, J.R. Marden, L.Y. Pao, "Wind plant power optimization through yaw control using a parametric model for wake effects," *Wind Energy*, 2015.
7. R. Gopalakrishnan, J.R. Marden, and A. Wierman, "Potential Games are Necessary to Ensure Pure Nash Equilibria in Cost Sharing Games," *Mathematics of Operations Research*, Volume 39, Number 4, pp. 1252-1296, 2014.
8. J.R. Marden, H.P. Young, and L.Y. Pao, "Achieving Pareto Optimality Through Distributed Learning," *SIAM Journal on Control and Optimization*, Volume 52, Issue 2, pp. 2753-2770, 2014. **[SIAM/CST Best Sicon Paper Prize]**
9. N. Li and J.R. Marden, "Decoupling Coupled Constraints Through Utility Design," *IEEE Transactions on Automatic Control*, Volume 59, Issue 8, 2014.
10. J.R. Marden and T. Roughgarden, "Generalized Efficiency Bounds in Distributed Resource Allocation," *IEEE Transactions on Automatic Control*, Volume 59, Number 3, 2014.
11. N. Li and J.R. Marden, "Game Design for Distributed Optimization," *IEEE Journal of Selected Topics in Signal Processing*, special issue on Adaptation and Learning over Complex Networks, Volume 7, Number 2, 2013.
12. J.R. Marden, S. Ruben, and L.Y. Pao, "Model-Free Approach to Wind Farm Control Using Game Theoretic Methods," *IEEE Transactions on Control Systems Technology* special issue "to tame the wind: advanced control applications in wind energy," Volume 21, Number 4, pp. 1207-1214, 2013.
13. J.R. Marden and A. Wierman, "Distributed Welfare Games," *Operations Research*, Volume 61, Issue 1, pp. 155-168, 2013.
14. J.R. Marden and A. Wierman, "Overcoming The Limitations of Utility Design for Multiagent Systems," *IEEE Transactions on Automatic Control*, Volume 58, Number 6, pp. 1402-1415, 2013.
15. J.R. Marden, "State Based Potential Games," *Automatica*, Volume 48, pp. 3075-3088, 2012.
16. J.R. Marden and M. Effros, "The Price of Selfishness in Network Coding," *IEEE Transactions on Information Theory*, Volume 58, Issue 4, pp. 2349-2361, 2012.
17. J.R. Marden and J.S. Shamma, "Revisiting Log-Linear Learning: Asynchrony, Completeness and a Payoff-based Implementation," *Games and Economic Behavior*, Volume 75, Issue 2, July 2012, pp. 788-808.
18. R. Gopalakrishnan, J.R. Marden, and A. Wierman, "An architectural view of game theoretic control," *ACM Sigmetrics Performance Evaluation Review*, Volume 38, Number 3, 2011, pp. 31-36.
19. J.R. Marden, G. Arslan and J.S. Shamma, "Cooperative Control and Potential Games," *IEEE Transactions on Systems, Man and Cybernetics. Part B: Cybernetics*, Volume 39, Issue 6, December 2009, pp. 1393-1407.
20. J.R. Marden, H.P. Young, G. Arslan, and J.S. Shamma, "Payoff Based Dynamics for Multi-Player Weakly Acyclic Games," *SIAM Journal on Control and Optimization*, special issue on "Control and Optimization in Cooperative Networks," Volume 48, Issue 1, February 2009, pp. 373-396.
21. J.R. Marden, G. Arslan and J.S. Shamma, "Joint Strategy Fictitious Play with Inertia for Potential Games," *IEEE Transactions on Automatic Control*, Volume 54, Issue 2, February 2009, pp. 208-220.

22. G. Arslan, J.R. Marden and J.S. Shamma, "Autonomous Vehicle-Target Assignment: A Game Theoretical Formulation," *ASME Journal of Dynamic Systems, Measurement and Control*, Volume 129, Issue 5, September 2007, pp. 584-596.

Proceedings of Refereed Conferences

1. P. Brown and J.R. Marden, "A Study on Price Discrimination for Robust Social Coordination," *American Control Conference*, 2015 (under review).
2. V. Ramaswamy and J.R. Marden, "A Sensor Coverage Game with Improved Efficiency Guarantees," *American Control Conference*, 2015 (under review).
3. J.R. Marden, B. Touri, R. Gopalakrishnan, and J.P. O'Brien, "The impact of information in a simple multiagent collaborative task," *Conference on Decision and Control*, 2015.
4. H. Borowski and J.R. Marden, "Understanding the Influence of Adversaries in Distributed Systems," *Conference on Decision and Control*, 2015.
5. P.N. Brown and J.R. Marden, "Optimal Mechanisms for Robust Coordination in Congestion Games," *Conference on Decision and Control*, 2015.
6. J.R. Marden, "Selecting Efficient Correlated Equilibria Through Distributed Learning," *American Control Conference*, 2015.
7. J.R. Marden, "The Role of Information in Multiagent Coordination," *Conference on Decision and Control*, 2014.
8. H. Borowski, J.R. Marden, and J.S. Shamma, "Learning Efficient Correlated Equilibria," *Conference on Decision and Control*, 2014.
9. R. Gopalakrishnan, S. Nixon, J.R. Marden, "Stable Utility Design for Distributed Resource Allocation," *Conference on Decision and Control*, 2014.
10. H. Borowski and J.R. Marden, "Fast Convergence for Time-Varying Semi-Anonymous Potential Games," *American Control Conference*, 2014.
11. P. Gebraad, F. Teeuwisse, J.W. van Wingerden, P. Fleming, S. Ruben, J.R. Marden, L.Y. Pao, "A Data-Driven Model for Wind Plant Power Optimization by Yaw Control", *American Control Conference*, 2014.
12. P.N. Brown and J.R. Marden, "Social Coordination in Unknown Price-Sensitive Populations," *Conference on Decision and Control*, 2013.
13. H. Borowski, J.R. Marden, and E.W. Frew, "Fast Convergence in Semi-Anonymous Potential Games," *Conference on Decision and Control*, 2013.
14. H. Borowski, J.R. Marden, D.S. Leslie and E.W. Frew, "Coarse Resistance Tree Methods For Stochastic Stability Analysis," *Conference on Decision and Control*, 2013.
15. R. Gopalakrishnan, J.R. Marden, and A. Wierman, "Potential Games are Necessary to Ensure Pure Nash Equilibria in Cost Sharing Games," *Electronic Commerce*, 2013.
16. J. R. Marden, H. P. Young, and L. Pao, "Achieving Pareto optimality through distributed learning," *Conference on Decision and Control*, 2012.

17. L. Na and J.R. Marden, "Game Design for Distributed Optimization with a Time Varying Communication Graph," *Conference on Decision and Control*, 2012.
18. R. Gopalakrishnan, J.R. Marden, and A. Wierman, "Characterizing Distribution Rules for Cost Sharing Games," *NetGCoop*, 2011.
19. D. Leslie and J.R. Marden, "Equilibrium Selection in Potential Games with Noisy Rewards," *NetGCoop*, 2011.
20. J.R. Marden, S. Ruben, and L.Y. Pao, "Surveying Game Theoretic Approaches for Wind Farm Optimization," *AIAA Aerospace Sciences Meeting*, 2011.
21. L. Na and J.R. Marden, "Game Design for Distributed Optimization," *Proceedings of the 50th IEEE Conference on Decision and Control*, 2011. [**Best Student Paper Finalist**]
22. J.R. Marden and J.S. Shamma, "Revisiting Log-Linear Learning: Asynchrony, Completeness and a Payoff-based Implementation," Allerton, 2010 (invited paper).
23. J.R. Marden and T. Roughgarden, "Generalized Efficiency Bounds in Distributed Resource Allocation," *Proceedings of the 49th IEEE Conference on Decision and Control*, 2010.
24. N. Li and J.R. Marden, "Designing Games to Handle Coupled Constraints," *Proceedings of the 49th IEEE Conference on Decision and Control*, 2010.
25. J.R. Marden and A. Wierman, "Overcoming Limitations of Game-Theoretic Distributed Control," *Proceedings of the 48th IEEE Conference on Decision and Control*, 2009.
26. N. Li, J.R. Marden, and J.S. Shamma, "Learning Approaches to the Witsenhausen Counterexample from a View of Potential Games," *Proceedings of the 48th IEEE Conference on Decision and Control*, 2009.
27. J.R. Marden and M. Effros, "The Price of Selfishness in Network Coding," *5th Workshop on Network Coding Theory and Applications*, 2009.
28. J.R. Marden and M. Effros, "A Game Theoretic Approach to Network Coding," *Information Theory Workshop on Networking and Information Theory*, June, 2009.
29. H. Chen, J.R. Marden, and A. Wierman, "On the Impact of Heterogeneity and Back-end Scheduling in Load Balancing Designs," *Proceedings of the IEEE Conference on Computer Communications (INFOCOM)*, 2008. (acceptance rate 19%)
30. J.R. Marden and A. Wierman, "Distributed Welfare Games," *Proceedings of the 47th IEEE Conference on Decision and Control*, 2008.
31. J.R. Marden, H.P. Young, G. Arslan, and J.S. Shamma, "Payoff Based Dynamics for Multi-Player Weakly Acyclic Games," *Proceedings of the 46th IEEE Conference on Decision and Control*, 2007.
32. J.R. Marden, G. Arslan and J.S. Shamma, "Connections Between Cooperative Control and Potential Games Illustrated on the Consensus Problem," *Proceedings of the European Control Conference*, 2007.
33. J.R. Marden, G. Arslan and J.S. Shamma, "Regret Based Dynamics: Convergence in Weakly Acyclic Games," *Proceedings of the 2007 International Conference on Autonomous Agents and Multiagent Systems*, 2007. (acceptance rate for full papers < 25%)
34. J.R. Marden, G. Arslan and J.S. Shamma, "Joint Strategy Fictitious Play with Inertia for Potential Games," *Proceedings of the 44th IEEE Conference on Decision and Control*, 2005.

Lectures and Workshop Presentations

- 2015 Colorado State University – Fort Collins, University of California, Santa Barbara, University of Pennsylvania, SoCal Network Economics and Game Theory Workshop – USC
- 2014 RECUV - University of Colorado, Leeds School of Business - University of Colorado, Boulder, (2) Workshop on Control and Game Theory, Ohio State University, University of Hawaii, Department of Electrical Engineering, Control and Dynamical Systems Seminar - University of Colorado, Banff Workshop on Optimal Cooperation, Communication, and Learning in Decentralized Systems
- 2013 Center for Control, Dynamical-Systems, and Computation - UCSB, Decision and Control Lecture Series - UIUC, Georgia Tech - ISyE , China Lake Naval Research Base
- 2012 Computer Engineering and Systems Group, Texas A&M. National Renewable Energy Laboratory. GAMES 2012 – Fourth World Congress of the Game Theory Society, Istanbul, Turkey. Center for Engineering Economics, Learning, and Networks, UCLA. Information Theory and Applications Workshop, UCSD.
- 2011 *Socal NEGT*, Caltech. Department of Economics, University of Colorado. Allerton Conference on Communication, Control, and Computing, UIUC. Department of Applied Mathematics, University of Colorado. *21st International Conference on Game Theory*, Stony Brook University. Department of Economics, University of Oxford, UK.
- 2010 *SISL/Yahoo! Research Microeconomics Workshop*, Huntington Beach, CA. LCCC Workshop on Distributed Decisions via Games and Price Mechanisms, Lund University, Sweden. Allerton Conference on Communication, Control, and Computing, UIUC.
- 2009 Keynote speaker at the *ALADDIN Game Theory Workshop*, University of Bristol. Cymer Center for Control Systems and Dynamics, UCSD. Department of Electrical Engineering, USC. Department of Computer Science, Stanford. Center for Control Dynamical Systems and Computation, UCSB. Center for Systems, Dynamics and Control, UCLA. *INFORMS*, San Diego, CA. *From Game Theory to Game Engineering Workshop*, University of Oxford. *19th International Conference on Game Theory*, Stony Brook University. Department of Mechanical Engineering, National Taiwan University. Department of Electrical and Computer Engineering, University of Colorado at Boulder. Department of Computer Science and Economics, Caltech. *2009 SISL/Yahoo! Research Microeconomics Workshop*, Huntington Beach, CA. Information Theory and Applications Workshop, UCSD. Decision and Control Laboratory, Georgia Tech.
- 2008 *Workshop on Frontiers in Game Theory and Networked Control Systems*, MIT. Social and Information Sciences Laboratory, Caltech. Department of Computer Science, Stanford. Department of Economics, University of Wisconsin–Madison. GAMES 2008 – Third World Congress of the Game Theory Society, Northwestern. Center for Control, Dynamical Systems and Computation, UCSB. Information Science and Technology Seminar, Caltech.
- 2007 *2007 SISL/Yahoo! Theory Workshop*, Huntington Beach, CA. Social and Information Sciences Laboratory Seminar Series, Caltech. *18th International Conference on Game Theory*, Stony Brook University. Department of Electrical Engineering, UCLA. *7th International Conference on Cooperative Control and Optimization*, Gainesville, Florida. Center for Neuromorphic Systems Engineering, Caltech.
- 2006 *17th International Conference on Game Theory*, Stony Brook University.
- 2005 *11th Southern California Nonlinear Control Workshop*, UCSD. *4th Annual UCLA Systems & Controls Symposium 2005*, UCLA.

Teaching Experience

Spring 2015	<i>Instructor.</i> Dynamic Programming, UCB.
Fall 2014	<i>Instructor.</i> Discrete Mathematics, UCB.
Spring 2014	<i>Instructor.</i> Game Theory and Multiagent Systems, UCB.
Fall 2013	<i>Instructor.</i> Discrete Mathematics, UCB.
Spring 2013	<i>Instructor.</i> Social and Economic Networks, UCB.
Fall 2012	<i>Instructor.</i> Discrete Mathematics, UCB.
Spring 2012	<i>Instructor.</i> Game Theory and Multiagent Systems, UCB.
Fall 2011	<i>Instructor.</i> Dynamic Programming, UCB.
Spring 2011	<i>Instructor.</i> Game Theory and Multiagent Systems, UCB.
Spring 2010	<i>Instructor.</i> Game Theory and Multiagent Systems, UCB.
Winter 2008	<i>Co-Instructor.</i> Topics in Algorithmic Game Theory, Caltech.
Fall 2007	<i>Co-Instructor.</i> Queueing Network Games, Caltech.
Winter 2006	<i>Teaching assistant.</i> MAE174 Probability and Statistics, UCLA.
Winter 2005	<i>Teaching assistant.</i> MAE174 Probability and Statistics, UCLA.
Fall 2002	<i>Teaching assistant.</i> MAE171A Introduction to Feedback and Control Systems, UCLA.

Advising Experience

2015–present	<i>Postdoctoral advisor</i> for Vinod Ramaswamy, University of Colorado at Boulder, on information in distributed engineering systems.
2012–present	<i>Graduate advisor</i> for Philip Brown, University of Colorado at Boulder, on robust mechanisms for social coordination.
2012–present	<i>Graduate advisor</i> for Holly Borowski, University of Colorado at Boulder, on characterizing mixing times in Markov chains.
2011–present	<i>Graduate advisor</i> for Yilan Chen, University of Colorado at Boulder, on game theory and cooperative control.
2013–2015	<i>Postdoctoral advisor</i> for Ragavendran Gopalakrishnan, University of Colorado at Boulder, on utility design for distributed engineering systems.
2014–2015	<i>Graduate advisor</i> for Matthew Philips, University of Colorado at Boulder, on the importance of budget in multiagent systems. Completed MS thesis.
2011–2014	<i>Graduate advisor</i> for Yassmin Shalaby, University of Colorado at Boulder, on game theoretic control. Completed MS thesis.
2009–2013	<i>Graduate advisor</i> for Ragavendran Gopalakrishnan, Caltech, on utility design for distributed engineering systems.
2007–2013	<i>Graduate advisor</i> for Na Li, Caltech, on game theoretic control of sensor networks.
2012–2013	<i>Undergraduate advisor</i> for David Johnson, on matching problems.
2011–2012	<i>Undergraduate advisor</i> for James Patrick O’Brien, on the impact of local information in multiagent coordination.
2011–2012	<i>Postdoctoral advisor</i> for Shalom Ruben, University of Colorado at Boulder, on wind farm optimization.
2010–2012	<i>Graduate advisor</i> for Matthew Kirchner, University of Colorado at Boulder, on efficiency bounds for distributed sensor allocation. Completed MS thesis.
2008–2010	<i>Graduate advisor</i> for Kenneth McKell, University of Hawaii at Manoa, on distributed resource allocation.
2008	<i>Undergraduate mentor</i> for Sherwin Doroudi, Caltech, 2008 SURF. A game theoretic approach to the sensor coverage problem.
2007	<i>Undergraduate mentor</i> for Na Li, UCLA and Zhejiang University, on a game theoretic approach to the team decision problem.

Industrial Work Experience

- 2004–2008 **Engineering Consultant.** InfoLenz Corporation.
Project: Optimization of Manufacturing Plan for Jet Engine Maintenance. Optimized part supply plan for a five year overhaul plan of a fleet of over 500 jet engines by minimizing the number of stocked parts while adhering to a maximum probability of missing a part using neuro-dynamic programming and reinforcement learning. The designed supply plan is currently in the process of being implemented.
Project: Optimization of JEM-EF Maintenance by Neuro-Dynamic Programming. Optimized maintenance policy for the exposure facility of a space station while adhering to system availability requirements and monetary constraints using dynamic and neuro-dynamic programming.
- 2005–2007 **Cofounder and Instructor.** SoCal Test Prep. Los Angeles, CA.
Cofounded a test preparation company to help students prepare for graduate school entrance exams. Focused on developing students analytical and problem solving skills. SoCal Test Prep instructed approximately 20 students with a high success rate.
- 1998–2007 **Controls Analyst.** Raytheon Systems Corporation, Space and Airborne Systems. El Segundo, CA.
Developed and implemented a procedure for dynamically balancing a beam steering mirror. Designed and developed an optical analysis program, HexMat, to aid in visualization and sensitivity calculation of any optical system. Received Raytheon Excellent Achievement Award for development of HexMat.

Professional Services

External Committees:

- TPC, Workshop on Estimation and Control in Networked Systems, 2012–2015
- TPC, 10th Workshop on the Economics of Networks, Systems and Computation, 2015
- TPC, IEEE Conference on Decision and Control, 2014–2015
- Selection Committee Best Student Paper, 49th Conference on Decision and Control, 2012
- TPC, International Conference on Computer Communications and Networks, 2010

Workshop/Tutorial Sessions:

- Special session organizer: “What you need to know about the academic job market,” ACC, 2015
- Workshop contributor: “Game Theory: Models and Applications to Networked Systems,” ACC, 2015
- Tutorial organizer: “Game Theory and Multiagent Systems,” CDC, 2014

Referee for Journals and Conferences:

- Conference on Decision and Control (CDC), American Control Conference (ACC), Gamesnet, AA-MAS, Electronic Commerce (EC), Sigmetrics, Infocom, Machine Learning Journal, IEEE Transactions on Control Systems Technology, IEEE Transactions on Automatic Control, Automatica, SIAM Journal on Control and Optimization, ASME Journal of Dynamic Systems, Measurement and Control, International Journal on Game Theory, Games and Economic Behavior, Operations Research, IEEE Journal on Scheduling, IEEE Letters, Wind Energy