Jacob W. Crandall, Ph.D.

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Appointments

Jul 2008 – present	**Masdar Institute of Science and Technology**, Abu Dhabi, UAE Assistant Professor, Information Technology Program
Jul 2008 – Jun 2009	**Massachusetts Institute of Technology**, Cambridge, MA Visiting Scholar, Technology and Development Program
Jan 2006 – Jun 2008	**Massachusetts Institute of Technology**, Cambridge, MA *Postdoctoral Associate*, Department of Aeronautics and Astronautics/CSAIL
Jun 2000 – Dec 2005	**Brigham Young University**, Provo, UT *Research Assistant*, Computer Science Department Supervisor: Prof. Michael A. Goodrich, HCMI–MAGICC Lab

Education

Thesis defended Dec 2005	**Brigham Young University**, Provo, UT Ph.D. in Computer Science Dissertation: *Learning Successful Strategies in Repeated General-Sum Games*
Thesis defended Dec 2003	**Brigham Young University**, Provo, UT M.S. in Computer Science Thesis: *Towards Developing Effective Human-Robot Systems*
Aug 2001	**Brigham Young University**, Provo, UT B.S. in Computer Science (minor in Mathematics)

Courses Taught

Fall 2009	*Computer Systems Engineering* (ITE 502) Masdar Institute of Science and Technology
Spring 2008	*Learning in Games* (16.499) Dept. of Aeronautics & Astronautics, Massachusetts Institute of Technology I taught and designed the curriculum for this graduate course http://www.mit.edu/~jcrandal/16.499/
Jan 2007	IAP workshop on *Distributed Learning* Dept. of Aeronautics & Astronautics, Massachusetts Institute of Technology I designed and taught this two-day workshop.
Summer 2004	*Data Structures* (CS 235) Computer Science Department, Brigham Young University

Student Advisement

I am currently advising the following Master's students at the Masdar Institute:
- Asad Ahmed
- Edmond Awad
- Malik Altakrori
- Mehmet Ergun
- Salman Ahmed
- Vimitha Manohar
- Yomna Mahmoud

Invited Talks

Jan 2010   Online Artificial Learning in Distributed Systems: Moving from Theory to Practice
            Carnegie Mellon – Qatar, Doha, Qatar

Apr 2009   The Hack that Happens: Putting Intelligence into AI
            Brown University, Providence, RI

Aug 2008   Computational Models to Support Human-Machine Interaction
            Institute for Human-Machine Collaboration (IHMC), Pensacola, FL

May 2008   From Policies to Aspirations – Learning to Collaborate and Compete in Repeated
            Games, **Intel Research**, Pittsburgh, PA

Oct 2007   **Jacob W. Crandall** and Sylvain Bruni
            Multi-UAV Research at MIT's Humans and Automation Laboratory
            MIT Lincoln Laboratory, Lexington, MA

Jul 2007   Decision Support for Supervisory Control of Multiple Unmanned Vehicles
            BAE Systems, Burlington, MA

Nov 2006   Predictive Metrics for Human-Robot Teams
            Computer Science Department, **University of Massachusetts Lowell**

Jul 2006   Measurement Technologies for Unmanned Vehicles
            Charles River Analytics Inc., Cambridge, MA

Nov 2005   Presentation on research in human-robot teams
            Dept. of Aeronautics & Astronautics, **Massachusetts Institute of Technology**

Feb 2005   Learning to Compete, Compromise, and Cooperate in Repeated General-sum Games
            Department of Computing Science, **University of Alberta**

Academic Service

Journal Reviewer   Systems, Man, and Cybernetics – Part A, Systems, Man, and Cybernetics – Part B, Journal of Economic Dynamics and Control, Machine Learning, IEEE Intelligent Systems, Human Factors, Artificial Intelligence, IEEE Transactions on Robotics, Journal of Aerospace Computing, Information, and Communication, Intelligent Service Robots, Journal of Artificial Intelligence Research

Program Committee/ Reviewer	LAMAS 2005, AAMAS 2006, AAMAS 2007, IJCAI 2007, AAAI 2007, AAAI 2007 Student Abstract Program Committee, ICRA 2007, ALAg 2007, RSS 2007, 2007 IS Best Paper Reviewer, HRI 2008, AAMAS 2008, RSS 2008, RO-MAN 2008, IROS 2008, AAAI 2008 Student Abstract Program Committee, NIPS 2008, AAMAS 2009, HRI 2009, IJCAI 2009, HRI 2010, ICAART 2010
Other Service	Session Chair, AIAA Infotech@Aerospace 2007, Video Co-Chair, HRI 2010

Publications

Citation counts are from *Google Scholar* as of Dec 2009 (self-references excluded)

Journal Articles

- **J. W. Crandall** and M. A. Goodrich. Learning to Compete, Cooperate, and Compromise Using Reinforcement Learning. *Machine Learning*, 2010. To appear.

- **J. W. Crandall**, M. L. Cummings, and C. E. Nehme. A Predictive Model for Human–Unmanned Vehicle Systems. *AIAA Journal of Aerospace Computing, Information, and Communication*, Vol 6, No. 11, pages 585-603, 2009.

- C. E. Nehme, B. Mekdeci, **J. W. Crandall**, and M. L. Cummings. The Impact of Heterogeneity on Operator Performance in Futuristic Unmanned Vehicle Systems. *International C2 Journal, Special Issue: Representing Human Decision Making in Constructive Simulations for Analysis*, Vol. 2, No. 2, 2008.

- **J. W. Crandall** and M. L. Cummings. Identifying Predictive Metrics for Supervisory Control of Multiple Robots. *IEEE Transactions on Robotics*, Vol 23, No. 5, Oct 2007. (citation count: 2)

- **J. W. Crandall**, M. A. Goodrich, D. R. Olsen, and C. W. Nielsen. Validating Human-Robot Interaction Schemes in Multi-Tasking Environments. *IEEE Transactions on Systems, Man, and Cybernetics – Part A*, Vol 35, No. 4, pages 438-449, July 2005. (citation count: 61)

Conference Papers, Book Chapters, and Workshop Papers

- **J. W. Crandall**, M. A. Goodrich, and L. Lin. Encoding Intelligent Agents for Uncertain, Unknown, and Dynamic Tasks: From Programming to Interactive Artificial Learning. *AAAI Spring Symposium: Agents that Learn from Human Teachers*, 2009.

- M. L. Cummings, P. Pina, **J. W. Crandall**. A Metric Taxonomy for Supervisory Control of Unmanned Vehicles. In Proceedings of *AUVSIs Unmanned Systems North America*, 2008.

- C. E. Nehme, **J. W. Crandall**, and M. L. Cummings. Using Discrete-Event Simulation to Model Situational Awareness of Unmanned-Vehicle Operators. Proceedings of the ODU/VMASC Capstone Conference, 2008.

- P. Pina, M. L. Cummings, **J. W. Crandall**, and M. Della Pena. Identifying Generalizable Metric Classes to Evaluate Human-Robot Teams. In *HRI Workshop on Metrics for Human-Robot Interaction*, 2008. (citation count: 1)

- **J. W. Crandall** and M. L. Cummings. Attention Allocation Efficiency in Human-UV Teams. AIAA Infotech@Aerospace Conference, 2007. (citation count: 1)

- C. E. Nehme, **J. W. Crandall**, and M. L. Cummings. An Operator Function Taxonomy for Unmanned Aerial Vehicle Missions. In *Proceedings of the 12th International Command and Control Research and Technology Symposium*, 2007. (citation count: 4)

- M. L. Cummings, C. E. Nehme, and **J. W. Crandall**. Predicting Operator Capacity for Supervisory Control of Multiple UAVs. In *Innovations in Intelligent Machines*, Volume 70, *Studies in Computational Intelligence*, J. S. Chahl, L. C. Jain, A. Mizutani, and M. Sato-Ilic, Eds., pages 11-36, 2007. (citation count: 7)

- **J. W. Crandall** and M. L. Cummings. Developing Performance Metrics for the Supervisory Control of Multiple Robots. In *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction*, 2007. (citation count: 16)

- M. A. Goodrich, T. W. McLain, **J. W. Crandall**, J. Anderson, J. Sun. Managing Autonomy in Robot Teams: Observations from Four Experiments. In *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction*, 2007. (citation count: 37)

- **J. W. Crandall** and M. A. Goodrich. Learning to Compete, Compromise, and Cooperate in Repeated General-Sum Games. In *Proceedings of the Twenty-second International Conference on Machine Learning*, Bonn, Germany, August 2005. (citation count: 21)

- **J. W. Crandall** and M. A. Goodrich. Learning to Teach and Follow in Repeated Games. In *AAAI Workshop on Multiagent Learning*, Pittsburgh, PA, July 2005. (citation count: 2)

- **J. W. Crandall** and M. A. Goodrich. Learning Near-Pareto Efficient Solutions With Minimal Knowledge Requirements Using Satisficing. In *AAAI Fall Symposium: Artificial Multiagent Learning*, Washington, D.C., October 2004. (citation count: 4)

- M. A. Goodrich, E. R. Boer, **J. W. Crandall**, R. W. Ricks, and M. L. Quigley. Behavioral Entropy in Human-Robot Interaction. In *Performance Metrics for Intelligent Systems Workshop*, Gaithersburg, MD, August 2004. (citation count: 7)

- **J. W. Crandall** and M. A. Goodrich. Establishing Reputation Using Social Commitment in Repeated Games. In *AAMAS Workshop on Learning and Evolution in Agent Based Systems*, New York City, NY, July 2004. (citation count: 4)

- **J. W. Crandall** and M. A. Goodrich. Multiagent Learning During On-Going Human-Machine Interactions: The Role of Reputation. In *AAAI Spring Symposium: Interaction between Humans and Autonomous Systems over Extended Operation*, Stanford, CA, March 2004. (citation count: 6)

- **J. W. Crandall** and M. A. Goodrich. Measuring the Intelligence of a Robot and its Interface. In *Performance Metrics for Intelligent Systems Workshop*, Gaithersburg, MD, September 2003. (citation count: 10)

- **J. W. Crandall**, C. W. Nielsen, and M. A. Goodrich. Towards Predicting Robot Team Performance. In *IEEE International Conference on Systems, Man, and Cybernetics*, Washington, D.C., September 2003. (citation count: 18)

- M. A. Goodrich, **J. W. Crandall**, and J. R. Stimpson. Neglect Tolerant Teaming: Issues and Dilemmas. In *AAAI Spring Symposium on Human Interaction with Autonomous Systems in Complex Environments*, Stanford, CA, March 2003. (citation count: 10)

- C. W. Nielsen, M. A. Goodrich, and **J. W. Crandall**. Experiments in Human-Robot Teams. *Multi-Robot Systems: From Swarms to Intelligent Automata*, Volume II, Editors Alan C. Shultz, Lynne E. Parker, Frank E. Schneider, Kluwer Academic Publishers. Washington, D.C., March 2003. (citation count: 15)

- **J. W. Crandall** and M. A. Goodrich. Principles of Adjustable Interactions. In *AAAI Fall Symposium on Human-Robot Interactions*, Cape Cod, MA, November 2002. (citation count: 7)

- **J. W. Crandall** and M. A. Goodrich. Characterizing Efficiency of Human-Robot Interaction: A Case Study of Shared-Control Teleoperation. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Laussan, Switzerland, October 2002. (citation count: 31)

- **J. W. Crandall** and M. A. Goodrich. Experiments in Adjustable Autonomy. In *IEEE International Conference on Systems, Man, and Cybernetics*, Tuscan, AZ, October 2001. (citation count: 18)

- M. A. Goodrich, D. R. Olsen, **J. W. Crandall**, and T. J. Palmer. Experiments in Adjustable Autonomy. In *Proceedings of the IJCAI Workshop on Autonomy, Delegation, and Control: Interaction with Autonomous Agents*, August 2001. (citation count: 94)

Theses and Reports

- **J. W. Crandall** and M. A. Goodrich. Satisficing Multi-Agent Learning: A Simple but Powerful Algorithm. Technical Report BYU-HCMI 2008-1, October 2008.

- **J. W. Crandall** and M. L. Cummings. A Predictive Model for Human-Unmanned Vehicle Systems. Technical Report HAL2008-05, June 2008 (citation count: 1).

- **J. W. Crandall** and M. L. Cummings. A Predictive Model for Human-Unmanned Vehicle Teams. Technical Report HAL2007-07, July 2007.

- **J. W. Crandall**. Learning Successful Strategies in Repeated General-Sum Games. Ph.D. Dissertation, Brigham Young University, December 2005.

- **J. W. Crandall**. Towards Developing Effective Human-Robot Systems. M.S. Thesis, Brigham Young University, December 2003. (citation count: 3)