

# J. Andrew Bagnell

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## Education

- Ph. D. Robotics, Carnegie Mellon University, August 2004  
Thesis: "Learning Decisions: Robustness, Uncertainty, and Approximation"  
*Advised by Jeff Schneider*
- M. Sc. Robotics, Carnegie Mellon University, 2002  
*Advised by Jeff Schneider*
- B. Sc. Electrical Engineering, University of Florida, 1998  
*Graduated with Highest Honors*

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## Research Interests

My primary interests lie in machine learning, control and their confluence. I am focused on developing both the theory and practice of systems that can adapt during interaction with an environment to make more intelligent decisions. Much of my current research focuses on learning for perception and planning systems in mobile robotics, however I also actively pursue learning for human-computer interaction and large-scale data mining.

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## Research Experience

- Research Scientist, *Carnegie Mellon Robotics Institute, Pittsburgh, PA*, August 2004 to present. Faculty member with *Robotics and Engineering Consortium*, the *Auton Lab*, and affiliated faculty with the *Center for Automated Learning and Discovery*.
- Graduate intern with *WhizBang Labs, Pittsburgh, PA*, Summer 2001, working with Andrew McCallum and Jonathan Baxter on learning with scoped features, efficient training of maximum entropy models, and large-scale feature induction methods.
- Post-bachelor intern with *Nortel Networks, Research Triangle Park, NC*, 1999 in both hardware and software design on the Next-Generation Networks project.
- Intern with *Harris Corporation, Melbourne, FL*, working in research and development, Summer 1995-1997.

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## Teaching

- Teaching Assistant, Graduate Machine Learning, Carnegie Mellon, 2000
- Teaching Assistant, Advanced Graduate Class in Mobile Robotics, Aveiro, Portugal, 1998
- Teaching Assistant, Intelligent Machine Design Lab, Florida, 1998

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### Awards and Honors

- National Science Foundation Graduate Fellow
- National Merit Scholar
- "Electric E", given to undergraduates achieving a better than 3.9 upper-division GPA

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### Professional Activities

#### *Workshops*

- Participant in *NSF/NASA Workshop on Autonomous Mobile Manipulation (AMM)*, Houston, March 2005.
- Co-organizer of Workshop: "Planning for the Real World: The promises and challenges of dealing with uncertainty", *Neural Information Processing Systems* 2003.  
[http://www.cs.cmu.edu/~nickr/nips\\_workshop/](http://www.cs.cmu.edu/~nickr/nips_workshop/)

#### *Invited Talks*

- *Modular Learning*, Workshop on "Atomic Learning", Toyota Technological Institute, 2006.
- *Policy Search Techniques for Practical Reinforcement Learning*, AAI Workshop on Real-World Reinforcement Learning, Washington, D.C., October 2004.
- *Learning Policies: Leveraging Supervised Learning for Planning and Control*, AI Seminar, Carnegie Mellon University, October 2003.
- *Recent Advances in Policy Search*, Machine Learning Seminar at University of Toronto, October 2003.
- *Policy Search by Dynamic Programming*, Workshop on "Reductions in Machine Learning", Toyota Technological Institute, September 2003.

#### *Advisor*

- Doctoral advisor: Ellie Lin (CMU RI), Nathan Ratliff (CMU RI), David Bradley (CMU RI), Purnamrita Sarkar (CMU CALD).
- Doctoral Co-advisor: Sajid Sadiqqi (CMU RI), Brian Ziebart (CALD).
- Masters Project Advisor: Michael Bode (RI).
- Served as Vision-Unit advisor for Juan Pablo Gonzalez (CMU RI).
- Served on graduate committees for: Paul Hsuing (CMU RI, Graduated '04), Young-Woo Seo (CMU RI).
- Serving on qualifier committees for: Maayan Roth (CMU RI), Sarjoun Skaff (CMU RI), Martin Stolle (CMU RI), Derek Hoiem (CMU RI), Sajid Sadiqqi (CMU RI), Dean Anderson (CMU RI), Gregory Barlow (CMU RI), E. Gil Jones (CMU RI), Stanislav Funiak (CMU RI), Brenna Argall (CMU RI).

#### *Service*

- Leader of Carnegie Mellon's *Robotics Summer Scholars* Program, 2006.
- Program Committee of AAI 2005, NIPS 2005, Senior Program Committee Member of ICML 2006.
- Editor, with Stefan Schaal, of special issue "Robot Learning" of the *International Journal of Robotics Research*, to be published 2006.
- Graduate admissions committee member for the Robotics Institute, 2001 and 2002.

- Regular reviewer for conferences and journals including Neural Information Processing Systems, International Joint Conference on Artificial Intelligence, International Conference on Robotics and Automation, International Conference on Machine Learning, Journal of Artificial Intelligence Research, Journal of Robotics and Autonomous Systems, Journal of Machine Learning Research, Journal of Artificial Intelligence Research, and the IEEE Conference on Humanoid Robotics.
- Co-founded the "Robots in the Classroom Project" at the University of Florida, an engineering outreach program for middle school students, 1997.

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## Publications

### *Refereed Publications*

- N. Ratliff, J.A. Bagnell & M. Zinkevich. "Maximum Margin Planning", *Submitted to* the International Conference on Machine Learning, Pittsburgh, PA, June 2006.
- B. Sofman, E. Lin, J.A. Bagnell, N. Vandapel, & A. Stentz. "Improving Robot Navigation Through Self-Supervised Online Learning", *Submitted to* Robotics Science & Systems, Philadelphia, PA, August 2006.
- N. Ratliff & J.A. Bagnell. "Fast Kernel Learning via Kernel Conjugate Gradient", *Submitted to* the International Conference on Machine Learning, Pittsburgh, PA, June 2006.
- J. A. Bagnell & A. Ng. "On Local Rewards and Scaling Distributed Reinforcement Learning", *Advances in Neural Information Processing Systems* (18) NIPS, Vancouver, BC, December 2005.
- J.A. Bagnell. "Robust Supervised Learning", *Proceedings of the American Association for Artificial Intelligence Conference*, June 2005.
- J. Schneider, D. Apfelbaum, J.A. Bagnell, R. Simmons. "Learning Opportunity Costs in Multi-robot Market Based Planners." *Proceedings of the International Conference on Robotics and Automation*, 2005.
- J.A. Bagnell, S. Kakade, A.Y. Ng & J. Schneider. "Policy Search by Dynamic Programming", *Advances in Neural Information Processing* (16) NIPS, Vancouver, BC. December 2003.
- J.A. Bagnell & J. Schneider. "Covariant Policy Search", *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI 2003)*. Acapulco, Mexico, August 2003
- D. Blei, J.A. Bagnell & A. McCallum. "Learning with scope, with application to information extraction and classification", *In Uncertainty in Artificial Intelligence: Proceedings of the Eighteenth Conference (UAI-2002)*, pages 53-60, San Francisco, CA, June 2002.
- J.A. Bagnell & J. Schneider. "Autonomous Helicopter Control using Reinforcement Learning Policy Search Methods", *In Proceedings of the International Conference on Robotics and Automation*, South Korea, May 2001.
- M. C. Nechyba & J.A. Bagnell. "Stabilizing Human Control Strategies through Reinforcement Learning", *Proceedings of the IEEE Hong Kong Symp. on Robotics and Control*, Hong Kong, 1999.
- J.A. Bagnell, K. Doty & A.A. Arroyo. "Comparison of Reinforcement Learning Techniques for Automatic Behavior Programming", *Proceedings of the Conference on Automated Learning and Discovery*, Pittsburgh, PA 1998.

### *Technical Reports*

- B. Sofman, J.A. Bagnell, A. Stentz, & N. Vandapel. "Terrain Classification from Aerial Data to Support Ground Vehicle Navigation", *Tech Report CMU-RI-TR-05-39*, Robotics Institute, Carnegie Mellon University, January, 2006.
- J.P. Gonzalez, J. Bagnell, S. Cook, T. Oberthur, A. Jarvis, & M. Rincon. "Gaussian Processes for Statistical Soil Modeling of the Tropics", *Tech Report CMU-RI-TR-05-52*, Robotics Institute, Carnegie Mellon University, October, 2005.

- Y. Seo, J.A. Bagnell, and K. Sycara. "Cost-Sensitive Learning for Confidential Access Control", Tech Report CMU-RI-TR-05-31, Robotics Institute, Carnegie Mellon University, June, 2005.
- N. Ratliff and J.A. Bagnell. "Kernel Conjugate Gradient", Tech Report CMU-RI-TR-05-30, Robotics Institute, Carnegie Mellon University, June, 2005.
- J.A. Bagnell & J. Schneider. "Policy Search in Kernel Hilbert Space", Tech Report CMU-RI-TR-03-45, Robotics Institute, Carnegie Mellon University, November, 2003.
- J.A. Bagnell, A.Y. Ng & J. Schneider. "Solving Uncertain Markov Decision Problems", Tech Report CMU-RI-TR-01-25, Robotics Institute, Carnegie Mellon University, August, 2001.

*Workshop and Symposia Publications*

- J.A. Bagnell. "Improving Robot Navigation through Machine Learning", Learning at Snowbird Workshop, 2006.
- J.A. Bagnell, N. Ratliff & M. Zinkevich. "Maximum Margin Planning", Neural Information Processing Systems Workshop on *Machine Learning Based Robotics in Unstructured Environments*, 2005.
- J.A. Bagnell & J. Schneider. "Policy Search in RKHS", Neural Information Processing Systems Workshop on *Learning with Kernels*, 2002.
- J.A. Bagnell, D. Blei & A. McCallum. "Integrating Scope into Learning", Neural Information Processing Systems Workshop on *Machine Learning Methods for Text and Images*, 2001.
- J.A. Bagnell & J. Schneider. "Policy Search Methods for Robustness and Exploration", Neural Information Processing Systems Workshop on *Reinforcement Learning: Learn the Policy or Learn the Value-Function?*, 2000.
- J.A. Bagnell & M. Nechyba. "Stabilizing Partially-Observed Human Control Strategies through Reinforcement Learning", AAAI Symposium on *Planning with Partially Observable Markov Decision Processes*, 1998.