

Matthew A. Zucker

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RESEARCH INTERESTS:

Robotics, motion planning, machine learning, numerical optimization, navigation, manipulation, obstacle avoidance, dynamic simulation, computer graphics.

EDUCATION:

- 2005 - present **The Robotics Institute, Carnegie Mellon University**, Pittsburgh PA.
Ph.D. candidate. *Expected graduation*: May 2010. 4.0+ GPA.
- 1998 - 2002 **Vassar College**, Poughkeepsie NY.
B.A., Cognitive Science, with honors. Conferred May 2002. 3.8 GPA.

RESEARCH EXPERIENCE:

- 2007 - 2009 **Learning Locomotion**, *The Robotics Institute, Carnegie Mellon University*. DARPA-funded competition to investigate planning & control algorithms for legged robots on rough terrain; I led the CMU team.
- 2005 - 2007 **Vision for Safe Driving**, *The Robotics Institute, Carnegie Mellon University*. Developed search-based algorithms to predict and classify dangerous driving conditions.

TEACHING EXPERIENCE:

- Summer 2006 **Teaching Assistant**, *Applications in Computer Graphics: Algorithmic Modeling and Animation, AIT Korea*. Korean government-sponsored initiative to familiarize university faculty with recent developments in the field.
- Summer 2006-07 **Co-Coordinator**, *The Robotics Institute, Carnegie Mellon University*. Designed and taught a one-day LEGO robotics workshop to expose incoming Ph.D. students from diverse backgrounds to concepts including mechanism & software design, sensor integration, and debugging.
- Fall 2006 **Teaching Assistant**, *15-462: Computer Graphics I, Carnegie Mellon University*.
- Fall 2002 **Teaching Assistant**, *COGS 211: Perception & Action, Vassar College*.

INDUSTRY EXPERIENCE:

- Summer 2009 **Senior Software Engineer**, *Rep Invariant Systems, Cambridge MA*. US Navy Phase I SBIR. Implemented a software prototype for multi-client, collaborative mission development to extend existing aviator planning software.
- Summer 2008 **Software Consultant**, *SEEGRID Corp., Pittsburgh PA*. Developed algorithms and software for navigation and manipulation planning on high degree-of-freedom robotic platforms.
- 2000 - 2005 **Senior Software Engineer**, *Bluefin Robotics Corp., Cambridge MA*. MIT spin-off company designing and manufacturing autonomous underwater vehicles. Created operator tools for mission planning, diagnostics, and data analysis, as well as publish/subscribe inter-process communications software used onboard the vehicles.
- 2002 - 2003 **Software Consultant**, *Vassar College, Poughkeepsie NY*. Developed a secure, campus-wide online voting system for student body elections.

PROFESSIONAL ACTIVITIES:

Invited/Industry Speaker:

- Boston Dynamics, Inc., Waltham MA, 2010
- Willow Garage, Menlo Park CA, 2009
- University of Southern California, Los Angeles CA, 2009
- Vassar College, Poughkeepsie NY, 2008
- DENSO Corporation, Nagoya Japan, 2006
- Toyota Research, Higashifuji Japan, 2005

Reviewer:

- Program Committee member, Physically Grounded AI track, AAI Conference
- IEEE Int'l Conference on Robotics and Automation
- IEEE/RSJ Int'l Conference on Intelligent Robotics and Systems
- Robotics: Science and Systems Conference
- IEEE Conference on Decision and Control
- IEEE-RAS Int'l Conference on Humanoid Robots

Memberships:

- Member Phi Beta Kappa, *Inducted May 2002*.
- Member Psi Chi, *Inducted May 2002*.

PUBLICATIONS:

Journal Articles:

- [1] M. Zucker, N. Ratliff, M. Stolle, J. Chestnutt, J.A. Bagnell, C. Atkeson, and J. Kuffner. Optimization and learning for rough-terrain legged locomotion. *International Journal of Robotics Research*. In review, expected publication mid-2010.

Refereed International Conferences:

- [2] M. Zucker, J.A. Bagnell, C. Atkeson, and J. Kuffner. An optimization approach to rough terrain locomotion. In *Proc. IEEE Int'l Conf. on Robotics and Automation*, 2010.
- [3] N. Ratliff, M. Zucker, J.A. Bagnell, and S. Srinivasa. CHOMP: Gradient optimization techniques for efficient motion planning. In *Proc. IEEE Int'l Conf. on Robotics and Automation*, 2009.
- [4] M. Zucker, J. Kuffner, and J.A. Bagnell. Adaptive workspace biasing for sampling based planners. In *Proc. IEEE Int'l Conf. on Robotics and Automation*, 2008.
- [5] N. Chan, J. Kuffner, and M. Zucker. Improved motion planning speed and safety using regions of inevitable collision. In *17th CISM-IFToMM Symposium on Robot Design, Dynamics, and Control (RoManSy'08)*, 2008.
- [6] M. Zucker, J. Kuffner, and M. Branicky. Multipartite RRTs for rapid replanning in dynamic environments. In *Proc. IEEE Int'l Conf. on Robotics and Automation*, 2007.
- [7] M. Zucker. Fast seafloor topography extraction and visualization from sparse AUV altimeter data. In *Proc. Oceans '05 Europe Conference*, 2005.

Technical Reports:

- [8] M. Zucker. *A Data-Driven Approach to High Level Planning*. PhD thesis, The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA. *Expected completion May 2010*.
- [9] M. Zucker. Approximating state-space obstacles for non-holonomic motion planning. Technical Report CMU-RI-TR-06-27, Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, May 2006.
- [10] M. Zucker. *Evolution of cooperative controllers for multi-agent systems*. Undergraduate thesis, Cognitive Science Department, Vassar College, 2002.