



## Trey Smith

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### Research Interests

**Robot decision-making in complex, uncertain environments**, with an emphasis on probabilistic reasoning, machine learning, fielded robot systems, and applications in astrobiology and planetary science. Specific interests include planning under partial observability, rover science autonomy (i.e. onboard science data understanding and response), rough-terrain navigation, and multi-robot task allocation.

### Education

2000-present Ph.D., Robotics, Carnegie Mellon University

1995-1999 B.S./B.S., Comp. Science/Math, Carnegie Mellon University, GPA 3.79/4

### Selected Projects



2003-2005 **Limits of Life in the Atacama**. Developed a science autonomy system to increase rover efficiency during long-range survey. The system used onboard instruments to automatically detect chlorophyll-containing organisms and command follow-up observations.



2000-2001 **Distributed Robot Architectures**. Studied multi-robot system architectures applied to coordinated manipulation in a construction task performed by three heterogeneous robots.



1999-2000 **Mars Autonomy Project**. Demonstrated Mars relevance of a local obstacle avoidance algorithm using JPL's Rocky 7 rover. An adaptation of the algorithm (called GESTALT) was adopted for use on the MER rovers.

### Selected Publications

**Focused Real-Time Dynamic Programming for MDPs: Squeezing More Out of a Heuristic**. T. Smith and R. Simmons. In *Proc. Nat. Conf. on Artificial Intelligence (AAAI)*, 2006.

**Autonomous Rover Detection and Response Applied to the Search for Life Via Chlorophyll Fluorescence in the Atacama Desert**. T. Smith, D. R. Thompson, S. Weinstein, and D. Wettergreen. In *Proc. Lunar and Planetary Science Conf. (LPSC)*, 2006.

**Autonomous Detection of Novel Biologic and Geologic Features in Atacama Desert Rover Imagery**. D. R. Thompson, T. Smith, and D. Wettergreen. In *Proc. Lunar and Planetary Science Conf. (LPSC)*, 2006.

**Point-based POMDP Algorithms: Improved Analysis and Implementation**. T. Smith and R. Simmons. In *Proc. Conf. on Uncertainty in Artificial Intelligence (UAI)*, 2005.

**Concepts for Science Autonomy During Robotic Traverse and Survey**. T. Smith, S. Niekum, D. Thompson, and D. Wettergreen. In *Proc. IEEE Aerospace Conf.*, 2005.

**Heuristic Search Value Iteration for POMDPs**. T. Smith and R. Simmons. In *Proc. Conf. on Uncertainty in Artificial Intelligence (UAI)*, 2004.

**Coordination of Heterogeneous Robots for Large-Scale Assembly**. D. Hershberger, R. Simmons, S. Singh, J. Ramos, T. Smith. In *Robot Teams: From Diversity to Polymorphism*, T. Balch, L. Parker (eds.), AK Peters, 2002.