

# Melissa M. Tanner

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## Education

- 2015 (expected) **Doctor of Philosophy**, *California Institute of Technology (Caltech)*, Pasadena, CA.  
Mechanical Engineering, concentrating on Aerospace Robotics
- 2009–2011 **Master of Science**, *California Institute of Technology*, Pasadena, CA.  
Mechanical Engineering
- 2005–2009 **Bachelor of Science**, *Massachusetts Institute of Technology (MIT)*, Cambridge, MA.  
Aeronautics and Astronautics with Information Technology

## Doctoral Thesis

- title *Online path planning for a tethered two-wheeled robot.*
- supervisor Professor Joel Burdick
- description A tethered robot traveling through an unmapped and relatively unknown terrain must institute a path-planning algorithm that accounts for this tether. Using homotopy classes, one can describe the possible placements of the tether and any resulting unreachable locations. I intend to incorporate homotopy constraints into an online planning algorithm, allowing a tethered rover to rappel down a cliff and safely return to the top at the end of its mission.

## Experience

### Teaching

- spring 2015 **Graduate Teaching Assistant**, *Caltech*, Pasadena, CA.  
Developed labs for and helped teach a new course on bio-inspired design.
- 2009–present **Machine Shop Teaching Assistant and Supervisor**, *Caltech*, Pasadena, CA.  
Prepared course material and taught the Engineering Design Laboratory class for 4 terms. Assisted students in Introduction to Mechanical Design for 2 terms. Taught machining skills to students in the ME teaching shop on a continuing basis.
- spring 2009 **Undergraduate Teaching Assistant**, *MIT*, Cambridge, MA.  
Prepared lab assignments and helped students in a comprehensive introductory robotics and AI course called Robotics Science and Systems I.

### Research and Vocational

- summer 2012 **Keck Institute for Space Studies (KISS) Student Lead**, *Caltech*, Pasadena, CA.  
Mentored a team of 5 undergraduates in developing soil sampling devices for Axel, a two-wheeled tethered extreme terrain robot. Led the team in developing devices to scoop in precise locations, percussively scoop hard-packed or icy dirt, and vacuum up loose soil.
- summer 2008 **Summer Undergraduate Research Fellow**, *Caltech*, Pasadena, CA.  
Designed and executed an experiment on the aerodynamics of yaw turning in fruit flies. Constructed a Reynolds-number-scaled robot to test a variety of wingbeat kinematics at a series of turning velocities.
- summer 2007 **Summer Intern**, *Jet Propulsion Laboratory*, Pasadena, CA.  
Contributed to the Extended Mission Plan as a team member of Cassini Mission Planning. Computed desired pass length, and placed reaction wheel friction tests. Chose times for “Kodak Moment” publicity pictures of Saturn and its moons.

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## Computer Skills

Platforms	Microsoft Windows, Linux	Math Tools	Matlab, Mathematica
Office	Microsoft Office, L <sup>A</sup> T <sub>E</sub> X	Web Skills	HTML, CSS, JavaScript, Apache
Job-Specific	SolidWorks	Languages	Python, C/C++, Java, Fortran, VisualBasic, Intel 8051 Assembly, MySQL

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## Awards

- KISS Grant Wrote a proposal and won a grant from the Keck Institute for Space Studies for Student-Led Mini-Program on soil-sampling for Axel.
- Caltech Space Challenge 2013 Winner Participated in the Caltech Space Challenge, to design a manned mission to the Martian moons in a week. As a member of Team Voyager, the winning team, I worked on EV activity, the manned habitat, the science requirements, and the landing locations.

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## Outreach and Community Service

- o Mentoring FIRST Robotics Team 4153 in FRC competitions.
- o MIT Educational Counselor, interviewing MIT applicants.

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## Publications

Jason B. Price, Melissa M. Tanner, Siddharth Krishnamoorthy, Ashley R. Chadwick, Andrew R. Dahir, Abhijeet Kumar, Ashley A. Williams, Chantz P. Thomas, Osazonamen J. Igbinosun, Paul Nizenkov, Karin M. Schlottke, Emil Nathanson, Sherrie A. Hall, Sydney Do, Jan Kolmas, and Bakari N. Hassan. A design proposal for Asaph-1: A human mission to Phobos. *The Journal of Space Operations*, 11(2):1, 2014.

Melissa M. Tanner and Joel W. Burdick. Online motion planning for tethered robots in extreme terrain. In *Proceedings of the 2013 IEEE International Conference on Robotics and Automation*, 2013.

Issa A.D. Nesnas, Jaret B. Matthews, Pablo Abad-Manterola, Joel W. Burdick, Jeffrey A. Edlund, Jack C. Morrison, Robert D. Peters, Melissa M. Tanner, Robert N. Miyake, Benjamin S. Solish, and Robert C. Anderson. Axel and DuAxel rovers for the sustainable exploration of extreme terrains. *Journal of Field Robotics*, 29(4):663–685, 2012.

Nikolaus Correll, Nikos Arechiga, Adrienne Bolger, Mario Bollini, Ben Charrow, Adam Clayton, Felipe Dominguez, Kenneth Donahue, Samuel Dyar, Luke Johnson, Huan Liu, Alexander Patrikalakis, Timothy Robertson, Jeremy Smith, Daniel Soltero, Melissa Tanner, Lauren White, and Daniela Rus. Indoor robot gardening: Design and implementation. *Intelligent Service Robotics*, 3:219–232, 2010.

William B. Dickson, Peter Polidoro, Melissa M. Tanner, and Michael H. Dickinson. A linear systems analysis of the yaw dynamics of a dynamically scaled insect model. *The Journal of Experimental Biology*, 213(17):3047–3061, 2010.

Nikolaus Correll, Nikos Arechiga, Adrienne Bolger, Mario Bollini, Ben Charrow, Adam Clayton, Felipe Dominguez, Kenneth Donahue, Samuel Dyar, Luke Johnson, Huan Liu, Alexander Patrikalakis, Timothy Robertson, Jeremy Smith, Daniel Soltero, Melissa Tanner, Lauren White, and Daniela Rus. Building a distributed robot garden. In *Intelligent Robots and Systems*, pages 1509–1516, 2009.

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