

# ANDREW D. WILSON

awilson@u.northwestern.edu

adwilson10.github.io

## PERSONAL PROFILE

---

As a Ph.D. graduate of the Neuroscience and Robotics Lab at Northwestern University, I have 7+ years of experience in the robotics field, specializing in the research and implementation of trajectory optimization and parametric learning algorithms for dynamical and multi-body systems. I am seeking a position which leverages my technical and management skills to develop innovative solutions for the robotics and automation industries.

## EDUCATION

---

**Northwestern University, Evanston, IL**

*December 2015*

Ph.D. in Mechanical Engineering

Dissertation Title: Information-based Trajectory Optimization for Active Estimation in Mechanical Systems

**Kellogg School of Management, Northwestern University, Evanston, IL**

*August 2014*

Certificate in Management for Scientists and Engineers

**The Pennsylvania State University, University Park, PA**

*May 2010*

B.S. in Mechanical Engineering

Honors in Aerospace Engineering

Thesis Title: "A Control Allocation Method for a Helicopter with On-Blade Control"

Minors in Engineering Entrepreneurship and Mathematics

## PROFESSIONAL EXPERIENCE

---

**Neuroscience and Robotics Lab (NxR) - Murphey Group** September 2010 - December 2015  
*Graduate Student* *Evanston, IL*

- Developed new parametric learning algorithms using iterative optimization for dynamic systems
- Carried out experiments validating theoretical findings on the Baxter Research Robot platform and a kinematic car platform written in custom Python and C++ code
- Experienced in developing algorithms and maintaining packages using ROS (Robot Operating System)
- Implemented several algorithms using projection-based optimal control, variational integration, and LQR control
- Current maintainer of `trep` - a Python C-extension module for rigid body simulation developed in the Murphey group
- Redesigned embedded systems for research platforms including quadrotors and a brachiating robot including component selection and PCB design with custom written PIC32 firmware.

**NASA Ames Research Center***Research Intern*

June 2009 - August 2009

*Moffett Field, CA*

- Analyzed parametric effects on a model of a helicopter utilizing trailing-edge flaps for primary control
- Studied the modes of vibration of the helicopter blades and stability of the helicopter system

**Technische Universität München***Research Intern*

May 2008 - August 2008

*Munich, Germany*

- Implemented a server-client interface between a KUKA robot controller and a QNX real-time operating system using Simulink and xPC target
- Collaborated with German doctoral students on industrial robot telepresence research

**NASA Robotics Academy - Goddard Space Flight Center***Research Intern*

June 2007 - August 2007

*Greenbelt, MD*

- Researched and developed simulations for innovative methods for robotic locomotion
- Analyzed mechanical and electrical characteristics of a new stepper motor design

**PUBLICATIONS**

---

**Journal Articles**

- J4. A. D. Wilson, J. A. Schultz, A. R. Ansari, and T. D. Murphey, "Dynamic Task Execution using Active Parameter Identification with the Baxter Research Robot," *IEEE Transactions on Automation Science and Engineering*, Under review.
- J3. E. Tzorakoleftherakis, A. R. Ansari, A. D. Wilson, J. A. Schultz, and T. D. Murphey, "Model-Based Reactive Control for Hybrid and High-Dimensional Robotic Systems," *IEEE Robotics and Automation Letters*, vol. 1, pp. 431-438, Jan. 2016.
- J2. A. D. Wilson, J. A. Schultz, and T. D. Murphey, "Trajectory Optimization for Well-Conditioned Parameter Estimation," *IEEE Transactions on Automation Science and Engineering*, vol. 12, pp. 28-36, Jan. 2015.
- J1. A. D. Wilson, J. A. Schultz, and T. D. Murphey, "Trajectory Synthesis for Fisher Information Maximization," *IEEE Transactions on Robotics*, vol. 30, pp. 1358-1370, Dec. 2014.

**Refereed Conference Papers**

- C4. A. D. Wilson, J. A. Schultz, A. R. Ansari, and T. D. Murphey, "Real-time Trajectory Synthesis for Information Maximization using Sequential Action Control and Least-Squares Estimation," *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 4935-4940, Oct. 2015.
- C3. A. D. Wilson and T. D. Murphey, "Maximizing Fisher Information Using Discrete Mechanics and Projection-Based Trajectory Optimization," *IEEE International Conference on Robotics and Automation*, pp. 2403-2409, May 2015.
- C2. A. D. Wilson and T. D. Murphey, "Local E-optimality Conditions for Trajectory Design to Estimate Parameters in Nonlinear Systems," *American Control Conference*, pp. 443-450, June 2014.
- C1. A. D. Wilson and T. D. Murphey, "Optimal Trajectory Design for Well-Conditioned Parameter Estimation," in *2013 IEEE International Conference on Automation Science and Engineering*, pp. 13-19, Aug. 2013. Best Conference Paper Award Finalist.

## Patents Issued

- P3. Walk and Roll Robot. U.S. Patent 8030873, Issued Oct. 4, 2011.
- P2. Directed Flux Motor. U.S. Patent 7919891, Issued Apr. 5, 2011.
- P1. Joint Assembly. U.S. Patent 7735385, Issued Jun. 15, 2010.

## HONORS

---

- Best Conference Paper Finalist, 2013 IEEE Conference on Automation Science and Engineering
- NDSEG Fellowship Recipient, 2010-2013
- NASA Aeronautics Scholarship Recipient, 2008-2010
- 2007 NASA Robotics Academy Audience Award for Best Presentation to a Non-Technical Audience
- Harding Louis Memorial Scholarship Recipient, 2008-2009
- Penn State President's Freshman Award, 2007
- PPG Industries Merit Scholarship, 2006
- Eagle Scout, Boy Scouts of America, 2006

## TEACHING EXPERIENCE

---

### **Everything is the Same: Modeling Engineered Systems**

Fall 2013

*Teaching Assistant*

- Created and filmed lab demonstration and monitored online forums for the Northwestern Massive Open On-line Course (MOOC).

## PROFESSIONAL AFFILIATIONS

---

- IEEE Robotics & Automation Society, Member
- ASME, Member