Mark Cutler

Curriculum Vitae

Education

2012–2015 **PhD**, *Massachusetts Institute of Technology*, Cambridge, *GPA – 4.7/5.0*.
PhD in Robotics

2010–2012 **MS**, *Massachusetts Institute of Technology*, Cambridge, *GPA – 4.7/5.0*.
Masters in Aeronautical and Astronautical Engineering

2004–2005,2007–2010 **BS**, *Brigham Young University*, Provo, UT, *GPA – 3.99/4.0*.
Bachelors in Mechanical Engineering

Dissertation

Title *Practical Robot Reinforcement Learning through Efficient Simulator Sampling*

Committe Jonathan P. How (chair), Leslie Kaelbling, Andrea Censi

Description Designing efficient algorithms for decision making under uncertainty for autonomous systems. Efficiency comes by properly incorporating possibly inaccurate simulations of system to be controlled.

Masters Thesis

Title *Design and Control of an Autonomous Variable-Pitch Quadrotor Helicopter*

Advisor Jonathan P. How

Description Designed, built, and programmed a novel autonomous multi-rotor helicopter capable of agile, aggressive, and aerobatic flight. Developed new flight control algorithms and autopilot hardware for the vehicle control.

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Experience

Vocational

2010–2010 **Mechanical Design Engineer**, SpotterRF, Orem, UT.
Developed new heat management techniques for small radar devices

Detailed achievements:
- Learned how to make amazing coffee
- Finally determined the reason for PC LOAD LETTER:
  - Paper jam
  - Software issues:
    - Word not sending the correct data to printer
    - Windows trying to print in letter format
  - Coffee spilled inside printer
- Broke the office record for number of kitten pictures in cubicle

2010–2011 **Summer Intern**, Lehman Brothers, Los Angeles.
Rated "truly distinctive" for Analytical Skills and Teamwork.

Volunteer

2005–2007 **Volunteer Representative**, *The Church of Jesus Christ of Latter-day Saints*, Rostov, Russia.
Learned Russian through daily interaction with locals as a missionary. Provided leadership and training for 16 other missionaries, overseeing operations in a geographical area covering over 300 miles.

Awards

2010–2015 National Science Foundation Graduate Fellow

2010–2011 Aurora Flight Sciences Fellow

2004–2010 Robert C. Byrd Honors Scholarship

Technical Highlights

Languages C/C++, python, Matlab, LaTeX, html, css

Tools ROS, Git, svn, SolidWorks

Professional Activities Paper reviewer for the International Journal of Robotics Research, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Control Systems Technology, IEEE Control Systems Magazine, ASME Journal of Dynamic Systems, Measurement and Control, Automatica, Robotics: Science and Systems, IEEE International Conference on Robotics and Automation, IEEE International Conference on Intelligent Robots and Systems, IEEE Conference on Decision and Control, American Control Conference, International Conference on Unmanned Aircraft Systems, European Control Conference, and IFAC Symposium on Automatic Control in Aerospace.

Interests

- My Kids
- Electronics
- Skiing
- Robots
- Racquet Sports
- Ultimate Frisbee

Publications

Mark Cutler, Thomas J. Walsh, and Jonathan P. How. Real-world reinforcement learning via multi-fidelity simulators. *IEEE Transactions on Robotics*, 2014 (submitted).

Mark Cutler and Jonathan P. How. Efficient reinforcement learning for robots using informative simulated priors. In *IEEE International Conference on Robotics and Automation (ICRA)*, Seattle, WA, May 2015. IEEE.

Yufan Chen, Mark Cutler, and Jonathan P. How. Decoupled multiagent path planning via incremental sequential convex programming. In *IEEE International Conference on Robotics and Automation (ICRA)*, Seattle, WA, May 2015. IEEE.

Girish Chowdhary, Tongbin Wu, Mark Cutler, and Jonathan P. How. Rapid transfer of controllers between UAVs using learning based adaptive control. In *IEEE International Conference on Robotics and Automation (ICRA)*, pages 5409–5416, Karlsruhe, Germany, May 2013. IEEE.

Mark Cutler, Thomas J. Walsh, and Jonathan P. How. Reinforcement learning with multi-fidelity simulators. In *IEEE International Conference on Robotics and Automation (ICRA)*, pages 3888–3895, Hong Kong, June 2014. IEEE.

Bernard Michini, Mark Cutler, and Jonathan P. How. Scalable reward learning from demonstration. In *IEEE International Conference on Robotics and Automation (ICRA)*, pages 303–308, Karlsruhe, Germany, May 2013. IEEE.

B. Michini, J. Redding, N. K. Ure, M. Cutler, and J. P. How. Design and flight testing of an autonomous variable-pitch quadrotor. In *IEEE International Conference on Robotics and Automation (ICRA)*, pages 2978–2979. IEEE, May 2011.

Girish Chowdhary, Tongbin Wu, Mark Cutler, Nazim Kemal Üre, and Jonathan How. Experimental results of concurrent learning adaptive controller. In *AIAA Guidance, Navigation, and Control Conference (GNC)*, pages 1–14, Minneapolis, MN, August 2012. AIAA. Invited.

Mark Cutler and Jonathan P. How. Actuator constrained trajectory generation and control for variable-pitch quadrotors. In *AIAA Guidance, Navigation, and Control Conference (GNC)*, pages 1–15, Minneapolis, Minnesota, August 2012.

M. Cutler, N. Kemal Ure, B. Michini, and J. P. How. Comparison of fixed and variable pitch actuators for agile quadrotors. In *AIAA Guidance, Navigation, and Control Conference (GNC)*, pages 1–17, Portland, OR, August 2011. (AIAA-2011-6406).

Mark J Cutler, Timothy W McLain, Randal W Beard, and Brian Capozzi. Energy harvesting and mission effectiveness for small unmanned aircraft. In *AIAA Guidance, Navigation, and Control Conference (GNC)*, pages 1–13, Toronto, Canada, August 2010.

Mark Cutler, Bernard Michini, and Jonathan P. How. Lightweight infrared sensing for relative navigation of quadrotors. In *International Conference on Unmanned Aircraft Systems*, pages 1156–1164, Atlanta GA, May 2013. IEEE.

Nazim Kemal Ure, Girish Chowdhary, Yu Fan Chen, Mark Cutler, Jonathan P. How, and John Vian. Decentralized learning based planning multiagent missions in presence of actuator failures. In *International Conference on Unmanned Aircraft Systems*, pages 1125–1134, Atlanta GA, August 2013. IEEE.

Mark Cutler. Design and Control of an Autonomous Variable-Pitch Quadrotor Helicopter. Master's thesis, Massachusetts Institute of Technology, Department of Aeronautics and Astronautics, August 2012.

Mark Cutler, Thomas J. Walsh, and Jonathan P. How. Reinforcement learning with multi-fidelity simulators (poster). In *NIPS Transfer and Multi-Task Learning Workshop*, 2013.

Wayne Barrett, Ryan Bowcutt, Mark Cutler, Seth Gibelyou, and Kayla Owens. Minimum rank of edge subdivisions of graphs. *Electronic Journal of Linear Algebra*, 18:530–563, 2009.

Scott L Thomson, Christopher A Mattson, Mark B Colton, Stephen P Harston, Daniel C Carlson, and Mark Cutler. Experiment-based optimization of flapping wing kinematics. In *AIAA Proceedings of the 47th Aerospace Sciences Meeting*, pages 1–8, 2009.