MATTHEW KELLY

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EDUCATION

Cornell University, Ithaca NY
M.S. Mechanical Engineering *August 2014*
Ph.D. Mechanical Engineering (**minor:** computer science) *May 2016, expected*
Award: National Science Foundation Graduate Fellowship

Tufts University, Medford MA
B.S. Mechanical Engineering (**minor:** music) *May 2011*
Summa Cum Laude with Highest Thesis Honors
Awards: Mechanical Engineering Prize, Benjamin G. Brown Scholarship

RESEARCH & WORK EXPERIENCE

Cornell Biorobotics and Locomotion Lab November 2011 - Present
Ph.D. Research, Advisor: Andy Ruina *Ithaca, NY*

· Simulation and control of bipedal robots. Trajectory optimization; Controller design; testing via simulation and implementation on the Cornell Ranger Robot; Operation and maintenance of robot.

Cornell Robot Learning Lab May 2012-December 2012
Independent Research, Advisor: Ashutosh Saxena, Computer Science *Ithaca, NY*

· Study of how Markov random fields can be used within a reinforcement learning framework to design a high-level controller. The test system is an aerial robot navigating with a 2D camera.

Tufts Biomechanical Engineering Lab November 2009 - August 2011
Advisor: Thomas James *Medford, MA*

· Design of a new sagittal bone saw, including manufacturing plans, building a prototype and test fixture, and conducting experiments. Machined all custom parts for the prototype saw and fixture (400+ Hours); tested the saw's performance; presented the results at an ASME conference, coauthored two conference papers and a journal paper, and submitted a US Patent.

MIT Non-Newtonian Fluids Lab January 2011 - August 2011
Advisor: Gareth McKinley (MIT), Chris Rogers (Tufts) *Cambridge, MA*

· Designed and implemented a non-linear feedback controller for a filament-stretching rheometer (FiSER). Programmed real-time data acquisition, analysis, and control systems in LabVIEW with a National Instruments cRIO and FPGA; wrote LabVIEW GUI.

FALA Technologies June 2008 - August 2008
Summer Intern *Kingston, NY*

· Used SolidWorks to generate 3D models and drawings for various parts; designed a mobile base for tabletop Staubli robotic arm.

TEACHING EXPERIENCE

Cornell Mechanical Engineering August 2012 - December 2012
Teaching Assistant: Mechatronics Lab *Ithaca, NY*

· Lab TA working with analog filters, motor control, and simple sensors (ultrasonic, tachometer, infrared); ATMega32 microprocessor (used to control a small wheeled robot).

Cornell Mechanical Engineering August 2012 - December 2012
Head Teaching Assistant: Undergraduate Dynamics *Ithaca, NY*

· Management responsibility for 12 teaching staff and logistics for 180 students.

· Taught recitation and lab.

TECHNICAL STRENGTHS

Computer Languages	Matlab, LabVIEW, Java, C/C++, LaTeX, HTML
Operating Systems	Windows (XP, Vista, 7), Linux (Ubuntu)
Hardware	Cornell Ranger, NI cRIO/FPGA, ATMega32 and ARM9 μC
Model-Based Estimation	Kalman Filter, EKF, UKF, Particle Filter, SRIF
Control Theory	PID, LQR, Robust Control, MPC, Hybrid Systems
Trajectory-Optimization	FMINCON, SNOPT
Misc. Algorithms	Reinforcement Learning, Genetic Programming
Solidworks	3D modelling, assemblies, technical drawings, FEA
Machine Design	See "Tufts Biomechanical Engineering Lab" section
Machining	Bridgeport manual mill, manual lathe, CNC mill
Carpentry	I build wooden furniture as a hobby

JOURNAL PAPERS

James, T. P., **Kelly, M. P.**, Lannin, Pearlman, J. J., and Saigal, A., "Sagittal Bone Saw with Orbital Blade Motion for Improved Cutting Efficiency," Transactions of ASME Journal of Medical Devices, Accepted for publication Nov. 2012.

Mary Jane Shultz, **Matthew Kelly** , Leonid Paritsky, and Julia Wagner, "A Theme-Based Course: Hydrogen as the Fuel of the Future" J. Chem. Ed. 2009, 86 (9), p1051.

CONFERENCE PRESENTATIONS

Kelly, M. P. , Ruina, Andy, "Trying to accomplish standing balance of a simple bipedal robot with small feet," Proceedings of the Dynamic Walking Conference, Pensacola Beach, FL, May 21-24, 2012. Poster Presentation.

Kelly, M. P. , Lannin, T.B., and James, T.P., "A Study of the Cutting Rate Performance of a Novel Sagittal Bone Saw," Proceedings of the JSME/ASME 2011 International Conference on Materials and Processing, Corvallis, OR, June 13-17, 2011.

PATENTS

James, T. P. and **Kelly, M. P.**, "Novel Blade Path to Introduce Impulsive Thrust Loading in Sagittal Sawing," U.S. Patent 61/495,678, Filed Jun. 10, 2011.