Taylor Howell

CONTACT INFORMATION

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EDUCATION

Ph.D. Candidate, Mechanical Engineering, Stanford University **Sept. 2017 - present**

Advisor: Zachary Manchester

M.S., Mechanical Engineering, Stanford University **June 2019**

Automatic Controls, Robotics

B.S., Mechanical Engineering, University of Utah **Dec. 2016**

Summa Cum Laude

RESEARCH

Research Assistant, Robotic Exploration Lab, Stanford University **May 2018–Present**

My research is focused on developing fast optimization tools for motion planning of robotic systems. Currently, I'm developing a fast solver for contact-implicit trajectory optimization. Previously, I was co-leading development of `TrajectoryOptimization.jl`, an open-source Julia package for solving constrained trajectory optimization problems.

Research Assistant, Telerobotics Laboratory, University of Utah **Oct. 2015 - Dec. 2016**

I devised and implemented a control policy to sort swarms of microrobots using rotating uniform magnetic fields for minimally invasive medical applications. This work included: applied physics, simulation, nonlinear optimization, fabrication of a scaled microrobot swarm, and writing C++ code to control a tri-axial Helmholtz-coil system.

Research Assistant, Utah Center of Excellence for Biomedical Microfluidics, University of Utah **Sept. 2014 - Oct. 2015**

I designed and built a forty-eight-syringe pump for a medical microfluidic system, developed standard operating procedures for a high-throughput drug screening and cytotoxicity evaluation system, and performed statistical analysis for ovarian-cancer cell experiments.

EXPERIENCE

Instructor, GREAT Summer Camp, University of Utah **Jun. 2017 – Jul. 2017**

Taught practical robotics and programming skills to elementary school students using the LEGO Mindstorm platform and developed projects and challenges for FLL skills, telerobotics, and kinetic-art themed weeks.

Co-founder, Cornaby-Howell LLC **Apr. 2015 – Oct. 2015**

I prototyped systems including: a touch display module with GUI, Arduino C code, a lead-screw system, and syringe attachment modules for precision high-throughput syringe pumps.

Twisty Puzzle Designer **Aug. 2007 – Jan. 2011**

I designed and built twisty puzzles with selling prices ranging from $25 - $850. I exhibited my work at the community's premier international event, Dutch Cube Day, in 2008.

Publications

1. B. Jackson*, **T. Howell***, K. Shah, M. Schwager, Z. Manchester. Scalable Cooperative Transport of Cable-Suspended Loads with UAVs using Distributed Trajectory Optimization. 2020. Robotics and Automation Letters.

2. **T. Howell***, B. Jackson*, Z. Manchester. ALTRO: A Fast Solver for Constrained Trajectory Optimization. 2019. International Conference on Intelligent Robots and Systems. Macao, China.

3. **T. Howell**, B. Osting, J. Abbott. Sorting Rotating Micromachines By Variations in Their Magnetic Properties. 2018. Physical Review Applied.

4. J. Arellano, **T. Howell**, J. Gammon, S. Cho, M. Janat Amsbury, B. Gale. Use of a highly parallel Microfluidic Flow Cell Array to determine therapeutic drug dose response curves. 2017. Biomedical Microdevices.

5. J. Arellano, J. Gammon, **T. Howell**, M. Janat-Amsbury, B. Gale. A Continuous Flow Microspotter for the Implementation of a High-Throughput Drug Screening and Cytotoxicity Evaluation System. 2015. BMES Annual Meeting.

Skills

Julia, C++, Python, Matlab
LaTeX, Git, Solidworks, ROS, Adobe Premiere Pro, Adobe Illustrator
Mill, Lathe, Vacuum Forming, Laser Cutting, Mold Making and Casting, Metal Sheet Fabrication

Coursework at Stanford

Convex Optimization EE364a, Convex Optimization II EE364b, Optimal Control AA203, Nonlinear Control AA209, Adv. Software Development CME212, Engineering Design Optimization AA222, State Estimation AA273, Principles of Robotic Autonomy AA274, Mechatronics ME210, Linear Dynamical Systems EE263, Introduction to Robotics ME320, Machine Learning CS229, Decision Making Under Uncertainty AA228, Control Design Techniques E205, Adv. Robotic Manipulation CS326, Adv. Feedback Control AA212, Optimization MS&E 211X, Experimental Robotics CS225a

Fellowships and Scholarships

Stanford Graduate Fellowship	**2017 – 2018**
University of Utah Undergraduate Research Opportunities Program Fellowship	**2016**
The Boeing Company Scholarship	**2016**
Shirley L. & Kathelyne O. Evans Endowed Scholarship	**2016**
Big Ten+ Grad Expo travel scholarship	**2016**
University of Utah Presidential Scholarship	**2013 – 2016**