Taylor A. Howell

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Education

Stanford University *Sept. 2017 – present*
Ph.D Mechanical Engineering (3.99 GPA)

University of Utah *May 2013 – Dec. 2016*
B.S. Mechanical Engineering Summa Cum Laude (3.99 GPA)
Capstone Project: Wireless Power for Aerial Robots

Research

Robotic Exploration Lab, Stanford University *May 2018 – present*
I am co-leading software and algorithm development of an open-source state-of-the-art trajectory optimization solver in Julia and have devised algorithms related to Differential Dynamic Programming including higher-order integration extensions, a minimum time formulation, a square root method to improve numerical ill-conditioning, and infeasible trajectory initialization for the iLQR algorithm.

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. This work included: Matlab simulations, optimization, fabrication of a scaled microrobot swarm, and writing a C++ library for a tri-axial Helmholtz-coil system.

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. Additionally, I 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 at GREAT Summer Camp, School of Computing, University of Utah *Jun. 2017 – Jul. 2017*
I taught robotics and programming to elementary school students using LEGO Mindstorms and developed projects and challenges for FLL skills, telerobotics, and kinetic-art themed weeks.

Co-founder at 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.

Skills

Julia, Python, C++, Matlab, Arduino C, R
Solidworks, ROS, Latex, Adobe Premiere Pro, Adobe Illustrator, Microsoft Word, Microsoft Excel
Mill, Lathe, Vacuum Forming, Laser Cutting, Mold Making and Casting, Metal Sheet Fabrication

Coursework at Stanford

Optimal Control AA203, Nonlinear Control AA209, State Estimation AA273, Principles of Robotic Autonomy AA274, Mechatronics ME210, Linear Dynamical Systems EE 263, Introduction to Robotics ME320, Machine Learning CS229, Decision Making Under Uncertainty AA228, Control Design Techniques E205, Advanced Feedback Control AA212, Optimization MS&E 211X

Publications

1. **T Howell**, B Osting, J Abbott. Sorting Rotating Micromachines By Variations in Their Magnetic Properties. 2018. Physical Review Applied.
2. 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.
3. 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.

Fellowships and Scholarships

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