
Summary

PhD Candidate in Biomedical Engineering at Northwestern University. Career interests include biomedical engineering positions in teaching, research, science communication, and academia. Specific areas of research interest include minimizing and compensating for deterioration of myoelectric prosthesis performance over time, and facilitating user correction of poor control, which are lacking aspects of prosthesis design and prevalent causes of user rejection of these devices.

Education

Northwestern University: PhD

Biomedical Engineering

Northwestern University: MS Summer 2014

Biomedical Engineering

Cum. GPA: 3.567

Colorado School of Mines: BS Spring 2012

Engineering – Mechanical Specialty

Cum. GPA: 3.418

Relevant Experience

Rehabilitation Institute of Chicago – PhD Research

Fall 2014 – Present

Current work focuses on creating bridge between fields of myoelectric prosthesis control and human motor control in order to address limitations in prosthesis control. Particular focus on how the prosthesis control algorithm affects a user's motor adaptation, and investigating how to facilitate adaptation to maintain adequate prosthesis control.

Rehabilitation Institute of Chicago – Master's Research

Winter 2012 – Winter 2015

Focus on improving control of partial-hand prostheses through optimization of EMG pattern-recognition parameters while preserving wrist mobility. Compared the performance of several pattern-recognition algorithms, analysis window lengths, and number of available grasps in terms of prediction accuracy and speed.

Anschutz Medical Campus - Volunteer Intern

Summer 2012

Worked with Dr. Richard Weir to design and CAD a 3 degree of freedom prosthetic hand. Responsible for measuring and creating SolidWorks models of existing prototype, designing thumb actuation mechanism and housing, and designing finger flexion system.

Colorado School of Mines - Senior Design

Fall 2011 – Spring 2012

Project involved reading EEG signals into a computer, determining the intentioned action, and driving a standing wheelchair. Team of six members developed an algorithm to interpret EEG readings and outfitted a powered standing wheelchair to automate movement as directed by the EEG signals.

ADA Technologies – Intern, Lead Engineer

Summer 2011

Lead Engineer on a DoD SBIR Phase I project involving fire detection and targeted fire suppression for use in an aircraft dry bay. As the sole engineer, personal associated tasks included patent research, prototype and control circuit design, fabrication, and quantitative testing.

Selected Publications

Earley EJ, Hargrove LJ, Kuiken TA. Dual Window Pattern Recognition Classifier for Improved Partial-Hand Prosthesis Control. *Frontiers in Neuroscience*. 2016; 10:58. doi:10.3389/fnins.2016.00058.

Earley EJ, Hargrove LJ. The Effect of Wrist Position and Hand-Grasp Pattern on Virtual Prosthesis Task Performance. *Biomedical Robotics and Biomechanics (BioRob)*. 2016; 542-547. doi:10.1109/BIROB.2016.7523682

Earley EJ, Adewuyi AA, Hargrove LJ. Optimizing Pattern Recognition-Based Control for Partial-Hand Prosthesis Application. *IEEE Engineering in Medicine and Biology Society Annual Conference*. 2014; 3574-3577. doi:10.1109/EMBC.2014.6944395.

Academic & Technical Skills

Pattern recognition, machine learning, probability and statistics

Neuroscience, human motor control, musculoskeletal anatomy

MATLAB, SolidWorks, LabVIEW

Certified SolidWorks Associate (CSWA); SolidWorks Simulation

Science communication; image and video editing

Machining techniques: lathe, vertical milling machine, drill press, soldering

Leadership & Activities

Chicago Communicating Science Conference (ComSciCon-Chicago) – Treasurer, Organizer
Organizer for second ComSciCon-Chicago conference to be held summer 2016. Responsible for managing budget and donated funds, securing conference location, reimbursing for spent funds, and running the actual event.

Northwestern University McCormick Graduate Leadership Council – Workshop Coordinator and Instructor

Work with the BME and McCormick staff to coordinate workshops for current graduate students to teach introductory through advanced MATLAB and SolidWorks skills. Coordinated additional workshops on subjects including Adobe Illustrator, Immunohistochemistry, Western Blotting, Statistics, Machine Learning, and Python. To date, over 600 graduate students have signed up for these workshops.

Northwestern University Biomedical Engineering Graduate Students Group – Co-President

Oversaw periodic BMEGS events, maintained communication with other officers, proposed and facilitated changes to annual BME research day including pop talks (short 3-minute overviews of research using jargon-free language), and rebuilt BMEGS website.

CSM Robotics Club – Treasurer

Managed \$26,000 budget per year, developed and submitted annual budget allocation request. Co-initiated project to design, build and program self-balancing wheelchair. Mentor for FIRST Robotics Competition (For Inspiration & Recognition of Science and Technology). Helped migrate from mentor-led to student-led project with critical oversight and guidance.