

Andrew Lai

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345 E Superior St.
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Education



Northwestern University, Evanston, IL

Ph.D. Candidate in Biomedical Engineering (current)

Master of Science in Biomedical Engineering, September 2014

GPA: 3.70



Lafayette College, Easton, PA

Bachelor of Science in Chemical Engineering; Mathematics minor, May 2011

GPA: 3.83

Research Experience

Graduate Student, Single Motor Unit Laboratory

Chicago, IL

Fall 2011 – present

- (Project 1) **Neural and biomechanical contributions to abnormal motor function in hemispheric stroke.** The goal of this project is to understand the mechanisms that drive movement disability in stroke survivors. To do this, we first measure muscle's electrical activity and muscle's elastic properties on stroke survivors' biceps brachii. Then, these data are interpreted in context of which cellular and molecular mechanisms could be responsible for the observed features in muscle's electrical and mechanical properties.
- (Project 2) **Compensation for muscle weakness in simulation and experiment.** The goal of this project was to understand how the nervous system compensates for muscular weakness. Using a musculoskeletal modeling software package, I simulated muscle contractions in healthy muscle and in weakened muscle. The simulation was complemented with a parallel experiment that temporarily weakened the brachialis muscle using a local anesthetic injection. Electrical activity of the muscle was compared between the healthy and weakened muscle using a matrix factorization algorithm. This algorithm demonstrated that the coordinated activity across muscles was largely unchanged after muscle weakness, in both simulation and experiment.

Intern, Cephus Corporation

Nashua, NH

Summer 2011

- **fMRI detection of deception.** The goal of this project was to detect deceptive behaviors using physiological markers of brain activity. My role was to analyze BOLD fMRI data in order to detect brain activity patterns indicative of deception. I used SPM2 (Statistical Parametric Mapping) and SPM8 to look for significant differences in fMRI signals during truth telling and deception. I determined that two versions of SPM performed equivalently, and both were able to detect deceptive behavior in 97% of subjects.

Posters

Tracking changes in passive muscle stiffness after acute and chronic hemispheric stroke. **Andrew Lai**, Nina Suresh, Xiaogang Hu, William Z. Rymer. Society for Neuroscience 2015.

Quantifying muscle tissue mechanics using 3D ultrasound elastography. Xiaogang Hu, **Andrew Lai**, Margaret Duff, Nina Suresh, William Z. Rymer. Society for Neuroscience 2015.

The effects of elbow flexor block on upper limb muscle coordination. Jinsook Roh, **Andrew Lai**, Monica Rho, Antoun Nader, Mark Kendall, Kristopher Karvelas, William Z. Rymer and Randall F. Beer. Society for Neuroscience 2014.

Stimuli Presentation Modification Improves Diagnostic Accuracy at the Individual Level for Functional MRI Detection of Deception. Laken SJ, **Lai A**, Johnson FA, Morgan, PS, Levine K, Fernald M, Patel K, Chung-Haas K, Cahill J, Kozel FA. 51st Annual Meeting American College of Neuropsychopharmacology, Dec 2012, Hollywood, FL.

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Academic Honors

Northwestern Center for Leadership Fellow	2013-2014
Carl J Staska Prize for Proficiency in Chemical Laboratory Skills	2011
Magna Cum Laude in Chemical Engineering	2011
Society of Chemical Industry/American Chemical Society Scholar	2010
Pi Mu Epsilon Mathematics Honors Society	2010
Tau Beta Pi Engineering Honors Society	2009

Leadership Positions

Leadership coach, Northwestern Center for Leadership Winter/Spring 2014, Spring 2016



- Coached Northwestern student group leaders through leadership challenges in weekly 1 on 1 conversations

Event coordinator, Northwestern Tango Fall 2015-present



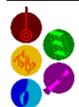
- Provide logistical support for club activities by coordinating venues for workshops, classes and events.

Youth mentor, YMCA SOAR Sept 2014-present



- Currently mentoring an Evanston area student through 8th and 9th grade.
- Plan events, outings and hang-outs with my mentee

Volunteer coordinator, Science Pentathlon Spring 2014-present



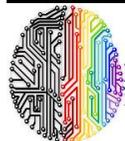
- Responsible for advertising, volunteer recruitment, and volunteer training for a middle school science/STEM pentathlon event.
- Coordinated volunteer communication with participant's parents

Judge, Chicago Area Undergraduate Research Symposium April 2013



- Evaluated student's research posters and provided feedback

Co-chair, McCormick Graduate Leadership Council Fall 2012- Fall 2013



- Led the design, budgeting (~\$8,000/yr), execution of programming for development of community within the engineering graduate school in a team of ~15 students
- Co-wrote successful Grant for a Preparing Future Professionals seminar series
- Co-wrote successful Community Building Grant for an engineering networking event with alumni

Representative, McCormick Graduate Leadership Council Fall 2011-present

- Planned and executed professional development workshops, networking events and community outreach

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Teaching Experience

Teaching assistant, Quantitative experimentation and design Spring 2015, 2016

- Assisted undergraduate students with designing and carrying out experiments in Biomedical Engineering 307: Quantitative experimentation and design laboratory
- Provided critical feedback on laboratory reports
- Taught quantitative skills for statistical analysis of experimental data using MATLAB software

Teaching assistant, Paradigms and Strategies of Leadership Fall 2013

- Led undergraduate students in discussion on case studies in leadership
- Graded essays and provided feedback for writing improvement

Other Experience

Chemical Analysis and Modeling, SCI Scholar Summer 2010

As a Society of the Chemical Industry (SCI) Scholar, I researched methodologies for the chemical analysis of a proprietary tissue preservation solution at Air Liquide. In a second project, I led the development and programming of a VBA-based proprietary sales tool and mathematical model.

Virus Aggregation: Professor Steven Mylon, Lafayette Chemistry Dept. Summer 2009

During the Summer of 2009, I worked in a chemistry lab, trying to replicate previously published MS2 virus attachment coefficient data. I was responsible for creating the stock solutions of virus and determining the virus' concentration. I plated bacteria, infected them with virus, and performed a test to determine how many plaque forming units were present per unit volume. I also created solutions of divalent electrolytes, alginate and virus. Subsequently, I characterized MS2 virus attachment using dynamic light scattering.

Green Engineering Laboratory: Professor Samuel Morton, Chemical Eng. Dept. Fall 2007-Jan 2009

The goal of my research was to determine if a novel ionic liquid environment could be used to enzymatically convert cellulosic waste products to useful a useful product, glucose. My role was to quantify the solubility of cellulose in different media at different temperatures using high performance liquid chromatography. I also quantified enzymatic glucose production rates in the ionic liquid. I found that the ionic liquid environment was unable to facilitate conversion of cellulose. I wrote a report detailing the results of the work, which was submitted to the Florida Agricultural and Mechanical University.

Skills and Training

Computers: MS Office suite (Powerpoint, Word, Excel), Visual Basic for Applications, MATLAB, some C, some microcontroller device development and programming.

Experimental: Musculoskeletal ultrasound, electromyography, human subjects experimental design and execution

Languages: Basic French (4 years of high school French).

Writing: Grant writing and preparation, two successful grants written for a student organization (~\$1000 each).