

# Claire Mitchell

Email: [clairelm@uw.edu](mailto:clairelm@uw.edu)

GitHub: [clairem2520](#)

## EDUCATION

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### University of Washington

*PhD Student in Information Science*

Seattle, WA

*September 2022 - Present*

**Highlighted Coursework:** Research Design, Quantitative Methods

### University of Washington

*Bachelor of Science in Bioengineering with a Minor in Applied Mathematics*

Seattle, WA

*September 2014 - June 2018*

**Highlighted Coursework:** Computational Methods for Data Analysis, Data Structures and Algorithms, Linear Algebra, Computer Programming, Neural Engineering Tech Studio, Neural Coding and Computation, Biomechanics

## EXPERIENCE

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### ACE Lab - Professor Jacob O. Wobbrock

*PhD Student*

University of Washington - Information Science

*September 2022 - Present*

**Focus:** Human-Computer Interaction, Accessibility, Ability-Based Design, Wearable Sensing

### Delsys, Inc.

*Research Engineer*

*Research Assistant*

Natick, MA

*July 2019 - May 2022*

*July 2018 - June 2019*

#### Personalized Augmentative and Alternative Communication (AAC) System

- Developed models of human-computer interaction (HCI) from wearable sensor data collected while participants used the inertial motion and electromyographic (EMG) sensing of the sensor to control cursor activity.
- Individualized the layout of a keyboard by utilizing the HCI models to algorithmically optimize the keyboard geometry to each participant's movement capabilities.
- Evaluated effectiveness of personalized keyboards in individuals with and without motor impairments.

#### Prosody Detection from EMG Features

- Developed a protocol to collect concurrent EMG and audio signals during speech.
- Used Keras to create models from EMG features to identify corresponding changes in pitch and intensity.

#### Motor Unit and EMG Analysis

- Designed and performed human subject experiments to collect electromyography and kinematic data for clinical, motor control, and exercise applications.
- Analyzed electromyography, motor unit, and kinematic data (MATLAB and Python) for conference presentations, grants, manuscripts, and internal communications.

#### Software Development

- Contributed to software in MATLAB to integrate algorithms for motor unit identification and analysis.
- Developed software in Python for visualization of motor unit data in real-time.
- Integrated Bluetooth updating of sensor firmware into a Windows environment with Python.
- Created specialized software in C# for collection of high fidelity EMG signals for motor unit decomposition.
- Constructed a SQL database system to expedite file access during analysis.

### Ability & Innovation Lab - Professor Kat Steele

*Undergraduate Research Assistant*

University of Washington - Mechanical Engineering

*Oct 2016 - June 2018*

#### Muscle Synergy Web Application - <https://synergy.me.uw.edu/>

- Used the Python framework, Flask, to create a web application for the calculation, visualization, and analysis of electromyography patterns and muscle synergy results.

#### Muscle Synergy Calculation and Analysis

- Used matrix decomposition techniques to extract and analyze muscles synergies from electromyography signals.

## PUBLICATIONS

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Vojtech, J.M., **Mitchell, C.M.**, Raiff L., Kline, J.C., De Luca, G., (October, 2022). Prediction of Voice Fundamental Frequency and Intensity from Surface Electromyographic Signals of the Face and Neck. *Vibration*, 5(4), 692–710. <https://www.mdpi.com/2571-631X/5/4/41>

**Mitchell, C.M.**, Cler, G.J., Fager, S.K., Contessa, P., Roy, S.H., De Luca, G., Kline, J.C., Vojtech, J.M. (August, 2022). Ability-Based Methods for Personalized Keyboard Generation. *Multimodal Technologies and Interaction*, 6(8):67. <https://www.mdpi.com/2414-4088/6/8/67>

## POSTERS AND PRESENTATIONS

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**Mitchell, C.M.**, Cler, G.J., Fager, S.K., Contessa, P., Roy, S.H., De Luca, G., Kline, J.C., Vojtech, J.M. (May, 2022). Ability-based Keyboards for Augmentative and Alternative Communication: Understanding How Individuals' Movement Patterns Translate to More Efficient Keyboards: Methods to Generate Keyboards Tailored to User-specific Motor Abilities. [Poster]. CHI, New Orleans, LA, USA <https://doi.org/10.1145/3491101.3519845>

**Mitchell, C.M.**, Letizi, J., Shiwani, B., Kline, J.C., Roy, S.H., De Luca, G., Contessa, P. (October, 2019). Strategy of Motor Unit Activation During Eccentric and Concentric Dynamic Contractions [Poster]. Neuroscience, Chicago, IL, USA

**Mitchell, C.M.**, Letizi, J., Shenoy, A., Chiodini, J., Shiwani, B., Roy, S.H., De Luca, G., Kline, J.C., Contessa, P. (August, 2019). Neuropathic Motor Unit Abnormalities Revealed by Surface-Detected Electromyography Decomposition [Presentation]. ISB-ASB, Calgary, AB, Canada

**Mitchell, C.M.**, Shuman, B., Steele, K., (May, 2018). Translating Muscle Synergies to Clinicians Through a Web-Based Application [Presentation]. NWBS, Bellingham, WA, USA

## AWARDS

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**NSF Graduate Research Fellowship:** 2023

## TEACHING

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<b>Advanced Methods in Data Science</b>	University of Washington - INFO 371
<i>Teaching Assistant</i>	<i>Fall 2022</i>

<b>Core Methods in Data Science</b>	University of Washington - INFO 371
<i>Teaching Assistant</i>	<i>Spring 2023</i>

## VOLUNTEERING

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**iSchool Diversity Ambassador:** Reviewed and provided feedback for information science PhD applications from BIPOC and other historically underrepresented groups.

**University of Washington's Society of Women Engineers' Industry Mentorship Program:** Mentored undergraduate students while working in industry.

**Synaptech - University of Washington Club:** Co-founded a neural engineering club at the University of Washington in order to connect undergraduates of all disciplines to the field.

## SKILLS

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**Languages:** Python, MATLAB, C#, SQL, Java

**Software & Technologies:** Flask, Git, Signal Processing, SciPy, Pandas, EMGworks, Keras