

Claire Mitchell

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EDUCATION

University of Washington

Seattle, WA

PhD Student in Information Science

September 2022 - Present

Highlighted Coursework: Machine Learning, Machine Learning for Neuroscience, Advanced Topics In Human-Computer Interaction, Quantitative Methods

University of Washington

Seattle, WA

Bachelor of Science in Bioengineering with a Minor in Applied Mathematics

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

University of Washington - ACE Lab

Seattle, WA

PhD Student

September 2022 - Present

Advisor: Jacob O. Wobbrock

Focus: Human-Computer Interaction, Accessibility, Wearable Sensing.

Meta - Input Explorations Team

New York, NY

Research Scientist Intern

June 2023 - September 2023

Focus: Text editing interactions during electromyography based handwriting.

Delsys, Inc.

Natick, MA

Research Engineer

July 2018 - May 2022

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

- Collected and evaluated electromyography and kinematic data for clinical, motor control, and exercise applications.

Software Development

- Developed software in MATLAB and Python for the visualization and analysis of motor unit data.

University of Washington - Ability & Innovation Lab

Seattle, WA

Undergraduate Research Assistant

Oct 2016 - June 2018

Advisor: Kat Steele

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.

CONFERENCE PAPERS

Yamagami, M., **Mitchell, C.M.**, Portnova-Fahreeva, A.A., Kong, J., Mankoff, J., Wobbrock, J.O. Customized Mid-Air Gestures for Accessibility: A \$B Recognizer for Multi-Dimensional Biosignal Gestures. <https://doi.org/10.48550/arXiv.2409.08402>. Under review.

Mitchell, C.M. Wobbrock, J.O. (October, 2024). Characterizing “Motor Ability” for Ability-Based Design. *Proceedings of the ACM Conference on Computers and Accessibility (ASSETS '24)*. St. John's, Canada, (October 28-30, 2024). New York: ACM Press. To appear.

JOURNAL ARTICLES

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>

WORKSHOP PAPERS

Mitchell, C.L. and Wobbrock, J.O. (2024). Physiological signals for ability-based design. Workshop on “Towards Best Practices for Integrating Physiological Signals in HCI (PhysioCHI '24).” ACM Conference on Human Factors in Computing Systems (CHI '24). Honolulu, Hawaii (May 11-16, 2024). Paper No. 18.

POSTERS AND PRESENTATIONS

Yamagami, M., Portnova-Fahreeva, A., **Mitchell, C.L.**, Kong, J., Wobbrock, J.O. and Mankoff, J. (2024). Personalized gesture classification for encouraging non-sedentary behavior during technology use in people with motor disabilities. Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC '24). Orlando, Florida (July 15-19, 2024). Piscataway, New Jersey: IEEE Engineering in Medicine and Biology Society.

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. [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

National Science Foundation Graduate Research Fellowship (2023)

TEACHING

Advanced Methods in Data Science
Teaching Assistant

University of Washington - INFO 371
Fall 2022

Core Methods in Data Science
Teaching Assistant

University of Washington - INFO 371
Spring 2023

VOLUNTEERING

National Science Foundation Graduate Research Fellowship Program Peer Reviewer: Reviewed and provided feedback for applications to the NSF GRFP.

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

Python (NumPy, Pandas, SciPy, Scikit-learn, Seaborn, Matplotlib, Keras, Tensorflow, Flask), **MATLAB**, **Git**, **L^AT_EX**, **EMGWorks**, **Signal Processing**