

TYLER G. PETRIE

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Engineering researcher with a focus on adaptive environments for spinal cord injury rehabilitation. Dedicated to the development of translational technologies for increased independence and community access. Exploring the impact of functional ability on the interface between bodies and the environment.

EDUCATION

PhD	Case Western Reserve University, Electrical Engineering Committee: Michael J. Fu (chair), Anne Bryden, Kevin Kilgore, Wyatt Newman, and M. Cenk Cavusoglu	Expected May 2026
BS	University of Washington, Electrical Engineering	June 2020

HONORS AND AWARDS

NSF Graduate Research Fellowship	2022
Callahan Fellowship	2020

RESEARCH EXPERIENCE

Interfaces & Interventions Group, Case Western Reserve University 2020-Present
Advisor: Michael Fu

Utilizing novel approaches in human-computer interaction to evaluate functional ability and minimize misfit with built environments. Developing Ability-Based Interfaces of daily Living (ABIL) to reveal previously unknown relationships between adaptive interface design and the physical environment, as well as determine their ability to improve the daily function of people with SCI. This research will leverage studies of user preference and task-specific assessments when the user interacts with realistic 3D virtual environments that allow the physical environment to be easily customized to the ability of the user.

Hypothesis: Controls for everyday objects that are personalized in location and size based on movement ability assessments will lead to greater function, especially for people with impaired movement due to SCI.

Sensing, System, & Communication Group, University of Washington 2019 to 2020
Undergraduate Research Assistant, Advisor: Matthew S. Reynolds

Spearheaded the development of a cutting-edge low-power wireless receiver tailored for a bespoke brain-computer interface featuring a sophisticated backscatter uplink mechanism. Designed and implemented a user-friendly graphic interface utilizing MATLAB, streamlining data collection.

Authored a peer-reviewed conference publication in IEEE RFID, showcasing innovative advancements in wireless communication technology within the neuroscience domain.

TEACHING & MENTORSHIP EXPERIENCE

Case Western Reserve University, Cleveland, OH 2021 - 2022

Teaching Assistant, Robotics I

- Assisted with Robotics I, a graduate course averaging 60 students per semester, covering the following topics: Forward Kinematics, Inverse Kinematics, Jacobian, Dynamic Robot Motion, Dynamic Path Planning
- Developed exams and review material
- Held weekly office hours
- Coordinated grading with another teaching assistant

Teaching Assistant, Digital Signal Processing

- Assisted with Digital Signal Processing, a graduate course averaging 20 students per semester, covering the following topics: Fourier analysis, continuous-time signal sampling and signal reconstruction, digital filter design, and random signal processing.
- Developed exams, homework solutions, and review material
- Held weekly office hours

Teaching Assistant, Digital Signal Processing

- Assisted with Digital Signal Processing, an undergraduate course averaging 30 students per semester, covering the following topics: Fourier series and transforms, analog and digital filters, fast-fourier transforms, sampling, and modulation for discrete-time signals and systems.
- Developed exams and review material, graded weekly assignments and assessments
- Held weekly office hours

Students Mentored:

Rawaa Almajeez (Masters Student) 2021 - 2022

**Jeremiah McLeod, Yamaira Flecha,
and Jarileze Gonzalez** (High School) 2021 - 2022

Lincoln West High School Senior Capstone Project

Ella Witallec (High School) 2021
Protégé Internship Program at the Laurel School

PUBLICATIONS

Journal Papers in Review

Petrie, T.G., Zhao, C., and Fu, M.J., “Evaluation of Point-to-Point Reaching Performance in Mixed Reality and Virtual Reality,” Submitted to: PRESENCE: Virtual and Augmented Reality.

Conference Papers

(Peer-Reviewed)

Petrie, T.G., Rosenthal, J. and Reynolds, M.S., “A Low Cost 1 Mbps Frequency Shift Keying Backscatter Receiver for Wireless Neural Recording,” IEEE International Conference on RFID (RFID), 2020, pp. 1-5, doi: 10.1109/RFID49298.2020.9244874.

PRESENTATIONS AND INVITED LECTURES

Poster Presentation: Petrie, T.G., Hart, R., Kilgore, K., Moynahan, M., Perkins, B., Wilson, J., Bryden, A., Schearer, E., Fu, M.J. “Analyzing Gaps in Assistive Technology for People with SCI According to Maslow’s Hierarchy of Needs: A Qualitative Study”, MetroHealth Research Symposium, Cleveland OH, October 13, 2023

Invited Presentation: Petrie, T.G., Polakowski, S., A., Schearer, E., Fu, M.J. “Unaddressed Technology Needs of People Living with High Tetraplegia” American Spinal Cord Injury Association Annual Meeting, New Orleans LA, May 18, 2022

Invited Presentation: Tyler G. Petrie and Luis Mesias Flores. MetroHealth Rehabilitation Institute Journal Club: Immersive virtual reality health games: a narrative game design review. MetroHealth System Dept. of Physical Medicine & Rehabilitation, Cleveland OH, June 2, 2021 (remote presentation)

Paper Presentation: “A Low Cost 1 Mbps Frequency Shift Keying Backscatter Receiver for Wireless Neural Recording,” IEEE International Conference on RFID, Oct. 16, 2020 (remote presentation)

PROFESSIONAL TRAINING

Mistequay Group, Ltd, Electrical Engineering Intern, 2019

- Built and validated critical test systems for data acquisition and control systems for machining company in the aerospace industry.
- Constructed cables for test system electrical enclosures.
- Designed printed circuit board to control torque with a magnetic particle brake for Gleason machine redesign.

Engineers Without Borders University of Washington, Electrical Team Lead,

2017-2020

- Facilitated the development of three solar-powered cell phone charging stations.
- Lead weekly meetings keeping team on schedule, acted as a resource for underclassmen new to engineering.
- Responsible for communication with other clubs and university departments regarding outreach events around campus.
- Coordinated events focusing on STEM education for grades K-8 in the Greater Seattle community and organized events to fundraise and recruit new members.
- Communicated with other team leads to support their roles and help when needed.
- *Outreach Director from Mar 2017- June 2019.*

LEADERSHIP

- Community of Advocates for Representation in Engineering**, Treasurer, 2023 - Present
- Manages organization funds and applies for grants.
 - Works alongside the School of Engineering administration to create a budget.
 - Manages a database of individual and institutional grants that members can apply for.
 - Develops mentorship opportunities between underrepresented graduate students and faculty and industry members.

COMMUNITY SERVICE

2024: CWRU Undergraduate Research Symposium judge, Undergraduate Summer Research Application reviewer, PhD Open House Planning Committee member
2023: CWRU Undergraduate Research Symposium judge
2022: Bay Stem Academy Mentoring
2019: Engineering Discovery Days
2018: UW Summer Youth Electronics Design and Fabrication, Emerson Elementary STEM Night, Engineering Discovery Days
2017: Engineering Discovery Days