

ALEXANDRA PORTNOVA

SWITZER RESEARCH MERIT FELLOWSHIP APPLICANT

First-year postdoctoral fellow, who is passionate about improving the quality of life for individuals with disabilities through the power of engineering innovation.



EDUCATION

09/2016 – 08/2022	PhD in Mechanical Engineering Northwestern University, Evanston, IL	GPA: 3.69
09/2016 – 08/2019	M.Sc. in Mechanical Engineering Northwestern University, Evanston, IL	GPA: 3.68
09/2012 – 06/2016	B.Sc. in Mechanical Engineering University of Washington, Seattle, WA	GPA: 3.57



PROJECTS

08/2022 – present	Quantifying inclusivity of hand-tracking devices <i>University of Washington, PI: Dr. Steele, Dr. Feldner, Dr. Mankoff</i> Assessing error in hand tracking of a commercially-available device (Leap Motion Tracker) by comparing it to hand kinematics obtained with Motion Capture system in individuals with upper-limb disabilities performing finger and wrist movements. Improving accessibility of device interactions via biosignals Generating an inclusive dataset of various biosignals (myoelectric, kinematics) recorded during user- and experimenter-defined device interactions to be used in the future to design inclusive gesture recognition algorithms.
11/2016 – 08/2022	Low-dimensional controller of high-dimensional systems <i>Robotics Lab, Northwestern University, PI: Dr. Mussa-Ivaldi</i> Quantifying performance of linear and nonlinear dimensionality reduction techniques on complex hand kinematics and gait. Developing a low-dimensional controller of a virtual hand with multiple degrees of freedom via dimensionality-reduction algorithms. Evaluating different learning paradigms to train users to operate a high-dimensional virtual hand via a low-dimensional controller.
11/2015 – 02/2019	3D-printed teaching model for thoracic epidurals <i>University of Washington, PI: Dr. Johnston</i> Creating and evaluating an open-source 3D-printed model for teaching placement of thoracic epidurals to anesthesia residents.
09/2014 – 06/2016	Open-source 3D-printed hand orthosis <i>ABILITY Lab, University of Washington, PI: Dr. Steele</i> Developing a novel fabrication method for traditional wrist-driven orthoses for individuals with spinal cord injury and evaluating its effectiveness with end-users and students in the Prosthetics and Orthotics department.

Personal Info

P: (425) 444 2096

E: aport6@uw.edu

Skills

Machine learning
Human-centered design
Data analysis
Simulation modeling in Unity
Myoelectric device control
Human computer interactions
Biosignal data collection
CAD modeling in SOLIDWORKS
Programming in C#, Python, MATLAB
3D-printing/3D-scanning
Product design

Languages

English 
Fluent/Excellent

Russian 
Fluent/Excellent

Hobbies

Ice hockey
Hiking
Mountain climbing
Crocheting



SCHOLARSHIPS, FELLOWSHIPS, & AWARDS

09/2016 – 06/2017	Walter P. Murphy Fellowship
02/2017	Precision Medicine Initiative Challenge, 3rd Place
06/2016	Mechanical Engineering Student Research Award
09/2015 – 06/2016	Levinson Emerging Scholar Award
06/2015 – 08/2015	Research Experiences for Undergraduates Fellowship
05/2015	Best Poster Award at NW Biomechanics Symposium
2015	Mary Gates Research Scholarship
2013-2015	School of Engineering Dean's List
09/2013 – 06/2015	C. E. Boucher Memorial Scholarship



PUBLICATIONS

AA Portnova et al. "Autoencoder-Based Myoelectric Controller for Prosthetic Hands." *Front Bioeng Biotech.* (in review)

AA Portnova et al. "Learning to Operate a High-Dimensional Hand via a Low-Dimensional Controller." *Front Bioeng Biotech.* (in review)

AA Portnova et al. "Challenges of Performing Dimensionality Reduction on Myoelectric Signals." *Front Bioeng Biotech.* (in preparation)

D Boe, **AA Portnova-Fahreeva** et al. "Dimensionality Reduction of Human Gait for Prosthetic Control." *Front Bioeng Biotech.* 2021.

AA Portnova-Fahreeva et al. "Linear and non-linear dimensionality-reduction techniques on full hand kinematics." *Front Bioeng Biotech.* 2020.

M Han, **AA Portnova** et al. "A do-it-yourself 3D-printed thoracic spine model for anesthesia resident simulation." *PLoS One.* 2020.

AA Portnova et al. "Design of 3D-printed, open-source wrist-driven orthosis for individuals with spinal cord injury." *PLoS One.* 2018.



CONFERENCES

AA Portnova, F Rizzoglio, I Nisky, E Rombokas, FA Mussa-Ivaldi. "Nonlinear dimensionality reduction simplifies the control of dexterous prosthetic hands." Society for Neuroscience (virtual) November 8-11, 2021.

AA Portnova, F Rizzoglio, I Nisky, E Rombokas, FA Mussa-Ivaldi. "Nonlinear autoencoders for dimensionality reduction of hand kinematics." Northwest Biomechanics Symposium (Bozeman, MT) May 18-20, 2019.

AA Portnova, G Mukherjee, KM Peters, A Yamane, KM Steele, "Open-Source 3D-Printed Hand Orthoses for Individuals with Spinal Cord Injury." American Society of Biomechanics (Raleigh, NC) August 2-5, 2016.

AA Portnova, G Mukherjee, KM Peters, A Yamane, KM Steele, "3D-Printed Wrist-Driven Orthosis for Individuals with Spinal Cord Injury." American Academy of Orthotists and Prosthetists (Orlando, FL) March 9-12, 2016.

AA Portnova, G Mukherjee, KM Peters, A Yamane, KM Steele, "Open-Source, 3D-Printed Orthoses to Improve Hand Function after Spinal Cord Injury." Society of Women Engineers 2016 Joint Conference (Seattle, WA) February 18-21, 2016.

AA Portnova, A Perez, G Mukherjee, KM Peters, A Yamane, KM Steele, "3D-Printed Open-Source Hand Orthoses for Individuals with Spinal Cord Injury." International Conference of Undergraduate Research (Seattle, WA) September 28-30, 2015.

AA Portnova, A Perez, G Mukherjee, KM Peters, A Yamane, KM Steele, "3D-Printed Open-Source Hand Orthoses for Individuals with Spinal Cord Injury." Undergraduate Research Symposium (Seattle, WA) August 19, 2015.

AA Portnova, G Mukherjee, KM Peters, A Yamane, KM Steele, "Fabrication and Testing of 3D-Printed Wrist-Driven Orthoses for Individuals with Spinal Cord Injury." Undergraduate Research Symposium (Seattle, WA) May 15, 2015.

AA Portnova, D Diepenbrock, A Yamane, KM Steele, "3D-Printed Wrist-Driven Orthosis for Patients with Spinal Cord Injury." Northwest Biomechanics Symposium (Seattle, WA) May 1-2, 2015. (Best Poster Award)