Maneeshika Madduri

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I am a PhD student at University of Washington researching human-computer interfaces and am **applying for PhD internships for Summer/Fall 2023**. I'm broadly interested in internships quantifying or developing human-computer interfaces and interactions using data-driven methods. My research applies game theory to create **individualized, high-performing neural interfaces** [P5]. I design data-driven, gradient-based algorithms to customize motor neural/EMG interfaces to users in real-time for out-of-box control [P1]. Through human-subject experiments and data analysis of biosensor multichannel time-series signals, I integrate these algorithms to improve performance of wearable human-computer interfaces. [P2-P4].

EDUCATION

University of Washington | PhD, Electrical and Computer Engineering — Seattle, WA | 2024 (Expected)
Advisors: Dr. Amy Orsborn, Dr. Sam Burden

Stanford University | MS, Electrical Engineering — Stanford, CA | 2013 - 2015

Stanford University | BS, Electrical Engineering — Stanford, CA | 2009 - 2013

SKILLS AND CLASSES

Programming: Python, C, MATLAB
Data Science: Numpy, Scipy, Sklearn, Data-driven Modeling, Biosignal Data Analysis
Relevant Classes: Reinforcement Learning, Machine Learning, Computational Neuroscience

FELLOWSHIPS AND AWARDS

Best Student Paper Finalist, 4th IFAC Workshop on Cyber-Physical Human Systems	2022
Best Theoretical Poster Award, UW ECE Research Symposium	2022
National Defense Science and Engineering Graduate (NDSEG) Fellowship	2020 - 2023
University of Washington College of Engineering Dean's Fellowship	2019 - 2020
Sandia National Laboratories Masters Fellowship	2012 - 2015
Fulbright Research Grant	2013 - 2014

PUBLICATIONS

P5. **M.M. Madduri**, S.A. Burden, and A.L. Orsborn, *Biosignal-Based Co-adaptive User-Machine Interfaces* (In Preparation).

P4. **M.M. Madduri**, M. Yamagami, A.X.T. Millevolte, S. Li, S. Burckhardt, S.A. Burden, and A.L. Orsborn, *Influencing User Learning in Co-adaptive Continuous-Control Myoelectric Interfaces*.(In Preparation).

P3. M. Yamagami, **M.M. Madduri**, B. Chasnov, H.Y. Chou, L.N. Peterson, S.A. Burden. *Co-Adaptation for Human-in-the-Loop Control Systems.* (In Preparation).

P2. **M.M. Madduri**, M. Yamagami, A.X.T. Millevolte, S. Li, S. Burckhardt, S.A. Burden, and A.L. Orsborn, *Co-Adaptive Myoelectric Interface for Continuous Control.* 4th IFAC Workshop on Cyber-Physical Human Systems. (2022). **Best Student Paper Finalist**

P1. **M.M. Madduri**, S. Burden, and A.L. Orsborn, *A Game-Theoretic Model for Co-Adaptive Brain-Machine Interfaces.* IEEE Conference on Neural Engineering and Rehabilitation (2021).

RESEARCH EXPERIENCE

University of Washington | PhD Candidate — Seattle, WA | Sept 2019 – Present

- Design and integrate adaptive algorithms to enable out-of-box neural interface usage (naive users could control 2D myoelectric interface within 5 minutes with no offline calibration)
- Build data-driven gradient-based adaptive algorithms to improve user performance and influence user learning for closed-loop motor neural interfaces
- Design and conduct human-subject experiments to evaluate algorithm and interface performance
- Analyze time-series biosensor data (neural and muscle activity) to measure user performance and learning with wearable interfaces
- Ongoing work includes integrating eye-tracking and accelerometry for adaptive algorithm design

Washington Research Foundation | Senior Venture Analyst — Seattle, WA | Sept 2021 – Present

- Assess early-stage health technologies for investment potential
- Conduct technical and market due diligence for investment summaries, including market competition research, technical research, IRR analysis, IP searches, research on regulatory and insurance reimbursement pathways
- Diligence work includes digital health, medical device and sensor companies, including three funded by WRF: BirchAI, MajorBoost, Somalytics

Fulbright Program | Student Scholar — Kathmandu, Nepal | Aug 2013 - Jun 2014

- Awarded the US Department of State Fulbright Research Grant for a one-year fully-funded research study to assess feasibility of grid-connected rooftop PV panels in Kathmandu, Nepal
- Conducted research focused on technical, economic and regulatory aspects of grid-connected distributed energy generation and partnered with RIDS-Nepal, a NGO in Kathmandu, Nepal

PROFESSIONAL EXPERIENCE

Cala Health | Hardware/Firmware Engineer — Burlingame, CA | May 2017 - Sept 2019

- Medical devices/neurotechnology start-up focused on developing peripheral nerve stimulation therapy for essential tremor
- Designed and implemented the power management component of the system, a power-safe logging system, a periodic system monitor, and other supporting components
- Engineered early-stage pipeline neurostimulation project, responsible for board re-design, layout, board bring-up and firmware design and programming
- Front-end research and development of real-time respiration monitoring technology combined with HRV and PPG measurements

Sandia National Laboratories | Computer Engineer — Albuquerque, NM | May 2015 - May 2017

- **Awards:** Sandia Spot Award for Excellence (2016) for leading a team through assembly and testing of custom hardware for an internal customer
- Member of Technical Staff in Sensors and Embedded Systems Group
- Validated of custom hardware, primarily for low-power and extreme environment conditions

Lab126 (Amazon.com, Inc) | Hardware Intern — Cupertino, CA | Jun 2012 - Sept 2012

- Researched and assessed the architecture of data transfer buses for optical systems, focusing on power management as part of the Systems Architecture group in the Digital Technology department

PRESENTATIONS

- Talk at 4th IFAC Workshop on Cyber-Physical Human Systems (Dec 2022)
  Co-adaptive Myoelectric Interfaces for Continuous Control
- Invited Talk at Carnegie Mellon University NeuroAI Reading Group (Nov 2022)
- Invited Student Talk at Whitaker Neuroengineering Workshop (August 2022)
  User-Decoder Learning Dynamics in Co-adaptive Myoelectric Interfaces
- Poster Presentation at Neural Control of Movement (July 2022)
  Modeling User-Decoder Learning Dynamics in Co-adaptive Myoelectric Interfaces for Continuous Control
- Selected Student Talk at Neural Computation and Engineering Connection (May 2022)
  Co-adaptive Myoelectric Interfaces for Continuous Control
- Poster Presentation at UW ECE Research Showcase (March 2022)
  A Game-Theoretic Model for Co-Adaptive Brain-Machine Interfaces
  Best Theoretical Student Poster Award
- Selected Student Talk at Neural Computation and Engineering Connection (May 2022)
  Co-adaptive Myoelectric Interfaces for Continuous Control
- Poster Presentation at IEEE Neural Engineering and Rehabilitation (May 2021)
  A Game-Theoretic Model for Co-Adaptive Brain-Machine Interfaces
- Poster Presentation at Neural Computation and Engineering Connection (Jan 2021)
  A Game-Theoretic Model for Co-Adaptive Brain-Machine Interfaces
- Presentation at Center for Neurotechnology Industry Symposium, Seattle, WA (Oct 2020)
  Modeling Co-adaptation in Brain-Machine Interfaces
- Poster Presentation at Neural Control of Movement (March 2020, Accepted)
  Simulating Neural Dynamics in a Closed-Loop Adaptive Decoder Brain-Machine Interface

INTELLECTUAL PROPERTY

IP1. Provisional Patent application filed. Optimal data-driven decision-making in multi-agent systems.

MENTORSHIP

Annika Pfister | Undergraduate (Wellesley, Neuroscience) — June 2022 - Sept 2022

Sasha Burckhardt | Undergraduate (UW, Neuroscience) — Jan 2022 - Present

Pamel Kang | Undergraduate (UW, ECE), now at Edwards Lifesciences — June 2020 - June 2021

SERVICE

Neuron Review | Manuscript Review, Prepared with A.L. Orsborn — Seattle, WA | Aug 2020
Graduate Student Association| Electrical and Computer Engineering — Seattle, WA | Jan 2020 - Sept 2021
NeuroTEC Podcast | Podcast co-organizer and co-host — Seattle, WA | Sept 2020 - July 2022
Neural Engineering Seminar Series | Organizing Member — Seattle, WA | Sept 2020 - Sept 2021
Girls on the Run | Assistant Coach, 3rd grade team — Seattle, WA | April 2021 - May 2021
LifeMoves | NextGen Advisory Board Member — Menlo Park, CA | Sept 2017 - Sept 2019