# Amber Hsiao-Yang Chou

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I am a PhD student in Electrical and Computer Engineering (ECE) at the University of Washington (UW). I am interested in integrating physiological sensing, including peripheral neural signals, eye movements, and gestures, to understand motor control in **human-machine interaction**. I leverage control theory, data-driven algorithms, and insights from experiments to enhance the usability of multimodal interfaces for applications in assistive technology and rehabilitation.

## Education

**University of Washington, Seattle**                                                      Seattle, WA
*Ph.D. in Electrical and Computer Engineering | Advisor: Samuel A. Burden*         *Sep. 2020 – Present*
Concentration: Human-Computer Interaction, Neuroengineering
Passed the PhD Qualifying Exam May 2022

**University of California, Davis**                                                          Davis, CA
*M.S. in Biological Systems Engineering | Advisor: Farzaneh Khorsandi*           *Sep. 2018 – Sep. 2020*

**University of California, Davis**                                                          Davis, CA
*B.S. with honors in Biological Systems Engineering*                             *Aug. 2014 – Sep. 2018*

## Research Experiences

**Graduate Student Researcher** | **BioRobotics Lab**                    Seattle, WA | *Sep. 2020 - Present*

- Designed and programmed a multimodal interface, integrating multi-channel surface EMG and eye-tracking signals in realtime, capable of adapting to individuals across diverse computer tasks such as tracking, pointing, and drawing [P5].
- Designed and conducted human-subject experiments for modeling users in multimodal interfaces [P5, P3, L2].
- Enhanced closed-loop human-machine interactions using game theory and machine learning algorithms [P5, P3, L4].
- Served as a scrum master in collaborative projects, designing interfaces that integrate haptic devices, gesture recognition technology, and a motion capture system with agile processes and rapid sprints [P4].

**Graduate Student Researcher** | **Machine Systems Lab**                  Davis, CA | *May 2018 – Sep. 2020*

- Developed and tested a navigation and steering system for the autonomous All-terrain Vehicle (ATV) based on GPS and image processing using Robotic Operation System (ROS) and OpenCV [P1, L1].
- Conducted outdoor field tests to evaluate the autonomous ATV and its safety systems.
- Collaborated on 3 projects including the development of the first ATV safety test station in the US, evaluating ATV safety for kids, and designing a chemical spraying system for orchards to improve safety for farmers.

**Sensor Engineering Intern** | **TacSense Inc.**                         Woodland, CA | *Feb. 2016 – June 2018*

- Integrated and tested pressure sensors into wearable products and assisted in prototyping for medical applications.
- Troubleshooted production issues in two research projects including fluid pressure and material strength analysis.
- Developed CAD designs for demonstration, documentation, and rapid prototyping.
- Skilled interpersonal communicator in both one-on-one and group settings.

## Archival Publications

P5.  **Chou A. H.Y.**, Li S.J., Madduri M., Christensen A., Hutchison F., Burden S. A., Orsborn A. L. Using Eye Gaze to Train an Adaptive Myoelectric Interface. *In preparation*. | bioRxiv | video demo

P4.  Li S.J., Madduri M., **Chou A. H.Y.**, Burden S. A., Orsborn A. L. Influencing Task Performance in Novel Hybrid Myoelectric Interfaces Through Decoder Adaptation. *In preparation*.

P3.  Yamagami M., Madduri M., Chasnov B., **Chou A. H.Y.**, Peterson L. N., Burden S. A. Co-adaptation improves performance in a dynamic human-machine interface. *In preparation*. | bioRxiv

P2.  Cashaback J. G.A., Allen J. L., **Chou A. H.Y.**, Lin D. J., Mangalam M., Price M. A., Secerovic N. K., Song S., Zhang H., Miller H. L. NSF DARE—transforming modeling in neurorehabilitation: a patient-in-the-loop framework. *Journal of Neuroengineering and Rehabilitation*. 2024. | Link

P1.  **Chou, H. Y.**, Khorsandi, F., Vougioukas, S. G., Fathallah, F. A. Developing and evaluating an autonomous agricultural all-terrain vehicle for field experimental rollover simulations. *Computers and Electronics in Agriculture*. 2022. (Vol.194, p. 106735). | Link

## Lightly Reviewed Publications

L5. **<u>Chou A. H.Y.</u>**, Madduri M., Li S.J., Burckhardt S., Christensen A., Hutchison F., Orsborn A. L., Burden S. A. Design principles for co-adaptive, multimodal interfaces. *ACM SIGCHI '24: Human-Factors in Computer Systems, PhysioCHI Workshop: Towards Best Practices for Integrating Physiological Signals in HCI*. 2024.

L4. Pfister A., Madduri M., **<u>Chou A. H.Y.</u>**, Burden S. A. Matching User and Machine Learning Rates in Co-Adaptive Closed-Loop Myoelectric Interfaces. *IEEE Conference on Neural Engineering and Rehabilitation 2023*.

L3. Peterson L. N., **<u>Chou A. H.Y.</u>**, Burden S. A., Yamagami M. Assessing Human Feedback Parameters for Disturbance-Rejection. *IFAC-PapersOnLine*, 55(41), pp.1-6. 2022. | Link

L2. **<u>Chou A. H.Y.</u>**, Yamagami M., Burden S. A. Evaluating a Human/Machine Interface with Redundant Motor Modalities for Trajectory-Tracking. *IFAC-PapersOnLine*, 55(41), pp.125-130. 2022. | Link

L1. **<u>Chou H. Y.</u>**, Khorsandi F. Developing and Testing a GPS-Based Steering Control System for an Autonomous All-Terrain Vehicle. *ASABE Annual Conference 2020*. | Link

## Honors & Awards

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|---|---:|
| UW ECE Chair's Award for Outstanding Collaboration and Teamwork | *May 2024* |
| UW The Weill Neurohub & CoNECT Student Travel Grant | *Feb. 2024* |
| UW Graduate & Professional Student Senate (GPSS) Travel Grant | *Feb. 2024* |
| Amazon Elevate Fellowship Funds ($10,000 award, 3 awardees) | *Dec. 2023* |
| UW NeuroTechnology, Engineering & Computing International Travel Award | *Apr. 2023* |
| UW ECE DEI Travel Award | *Apr. 2023* |
| Fellow at NSF Disability and Rehabilitation Engineering (DARE) [P5] | *Mar. 2023* |
| UW ECE sponsorship for the Women in Science and Engineering (WiSE) Conference | *Feb. 2021* |
| UC Davis Peter J. Shields and Henry A. Jastro Research Award | *2019-2020* |
| UC Davis Bio and Ag Engineering Graduate Student Researcher Fellowship | *2018-2020* |
| UC Davis Jastro-Shields Travel Award | *Apr. 2018* |
| Robert Roy Owen Scholarship & Howard R. Murphy Scholarship | *2017-2018* |
| UC Davis Dean's Honor List in College of Engineering | *2015, 16, 18* |

## Skills & Coursework

**Technical Skills**: Experimental Design, Problem Identification and Formulation, Data Analysis, Scientific Writing

**Soft Skills**: Project Management, Problem-solving, Collaboration, Mentoring

**Programming languages**: Python, Matlab

**Software & Tools**: ROS, OpenCV, PyTorch, Arduino, Raspberry Pi, Labgraph (Meta), SolidWorks, LaTeX, jupyter, matplotlib

**Operating Systems**: Microsoft Windows, macOS, Linux

**Relevant Coursework**: Control Theory, Game Theory, Machine Learning, Computer Vision, Robotics, Statistics, Probability, Signal Processing, Data Analysis, Neural Engineering, Deep Learning for Neuroscience

## Teaching

**Sex, Gender, and Engineering** | **Teaching Assistant**      Seattle, WA | *Fall 2024*
- Provided feedback to students' research papers and homework for 30+ undergraduate students.

**Teaching Engineering** | **Teaching Assistant**      Seattle, WA | *Spring 2024*
- Graded homework and class project for 45+ undergraduate students.
- Taught a short lesson about making and presenting academic posters.

**Engineering Design and Communication** | **Teaching Assistant**      Davis, CA | *Fall 2019*
- Led undergraduate engineering design and communication labs and studios.
- Assisted in organizing undergraduate research showcase for 100+ undergraduate students.

**Engineering Economics** | **Teaching Assistant**      Davis, CA | *Winter 2019, 2020*
- Assisted in teaching undergraduate engineering economics class with 80+ students.
- Led office hours and guided students' class projects.

**Classical Physics** | **Lab Teaching Assistant**      Davis, CA | *Spring 2019*
- Taught 4 undergraduate physics labs with a total of 80+ students.

## Mentorship

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|---|---|
| Liya Hutchison, *UW informatics undergraduate* | *Winter 2023 - Present* |
| Emmy Chow, *UW ECE PhD* | *Fall 2023 - Present* |
| Andrew Christensen, *UW HCDE undergraduate* | *Spring 2023 - Spring 2024* |
| Annika Pfister, *Wellesley Neuroscience, now PhD student at UW ECE* | *Summer 2022* |
| Lauren Peterson, *UW ECE undergraduate, now PhD student at Rice* | *Winter - Spring 2021* |
| Alexis Blakes, *UW Center for Neurotechnology Research REU student* | *Summer 2021* |

## Presentations

- Poster presentation, Neural Control of Movement (NCM) — *Apr. 2024*
  *Enhancing Co-Adaptive Myoelectric Interfaces with Eye Tracking*
- Lightning talk and poster presentation, UW ECE Research Showcase — *Mar. 2024*
- Oral Presentation, UW Elevate program partnership with Amazon Robotics — *Feb. 2024*
  *Personalized Multimodal Human-Machine Interfaces*
- Poster presentation, Women in NeuroAI, UW Center for Neurotechnology — *Feb. 2024*
  *Using Eye Tracking to Train Adaptive Myoelectric Interfaces*
- Poster presentation, Neural Control of Movement (NCM) — *Apr. 2023*
  *Uncontrolled manifold emerges from coordinated feedback in human-machine interaction*
- Lightning talk and poster presentation, UW ECE Research Showcase — *Mar. 2023*
- Poster presentation, NSF Disability and Rehabilitation Engineering (DARE) — *Mar. 2023*
  *Uncontrolled manifold emerges from coordinated feedback in human-machine interaction*
- Oral and poster presentation, IFAC Workshop on Cyber-Physical Human System (CPHS) — *Dec. 2022*
  *Evaluating a Human/Machine Interface with Redundant Motor Modalities for Trajectory-Tracking*
- Poster presentation, UW WomXn at the Forefront of ECE Research — *Dec. 2021*
  *Optimally Combine Sensorimotor Pathways in Human-Machine Task with Multiple Sensory Modalities*
- Oral presentation, American Society of Agricultural and Biological Engineers (ASABE) — *July 2020*
  *Developing and Testing a GPS-Based Steering Control System for an Autonomous All-Terrain Vehicle*
- Poster presentation at the ASABE CA-NV Section meeting in Tulare, CA — *Feb. 2020*
- Oral presentation, American Society of Agricultural and Biological Engineers (ASABE) — *July 2019*
  *Developing and Testing an Autonomous All-Terrain Vehicle to Experimentally Test Rollover Incidents*
- Poster presentation at the International Society for Agricultural Safety and Health (ISASH) — *June 2019*
  *Developing an Autonomous All-Terrain Vehicle to Evaluate Performance of Crush Protection Devices in Rollover Incidents.*
- Poster presentation, UC Davis Engineering Senior Design Showcase — *June 2018*
  *Semi-autonomous temperature monitoring system of large-scale poultry compost windrows*

## Services & Outreach

**K12 Outreach, UW Engineering Discovery Days** — *May 2024*
- Presented EMG-controlled devices and organized hands-on activities for 4th through 8th-grade students.
- Mentored three undergraduate students in making a poster and facilitating interactive activities.

**Student Representative, ECE Faculty Search Committee** — *Winter - Spring 2024*
- Organized and facilitated student meetings with 10 faculty candidates.
- Attended search committee meetings and provided collected feedback from attendees.

**Co-Chair, WomXn at the Forefront of ECE Research Conference (WAFER) | Link** — *Fall 2023*
- Organized WAFER with 100+ attendees to highlight research conducted by women and non-binary individuals.
- Invited speakers including faculty and industry leaders from Amazon, Boeing, Impinj, Meta, and Microsoft.

**Organizing Member, UW ECE Graduate Student Coffee Chat** — *Fall 2023 - Spring 2024*
- Organizing monthly graduate student coffee chats for networking and community building.

**Seminar Host, DUB (Design, Use, Build) | Link** — *Spring 2023 - Winter 2024*
- Hosted and moderated the bi-weekly DUB seminars with 100+ attendees from the HCI community.

**Conference Moderator, NSF Disability and Rehabilitation Engineering (DARE) | Link** — *Mar. 2023*
- Moderated conference presentations and took notes as an NSF DARE fellow.

**Mentor, UW ECE Graduate Application Support Program** — *Fall 2021, Fall 2022*
- Mentored six undergraduate students and provided feedback on their graduate school applications.

# References

**Samuel A. Burden (PhD advisor)**
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