

Amber Hsiao-Yang Chou

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I am a PhD student in Electrical and Computer Engineering (ECE) at the University of Washington, Seattle (UW). My research interest lies in the intersection of bioengineering and electrical & computer engineering, with a specific focus on **human-machine interaction**. My research leverages data-driven algorithms and theoretical principles drawn from control theory and game theory, along with knowledge of human sensorimotor systems obtained through experimentation. This synthesis of knowledge and expertise is aimed at advancing the usability of multimodal interfaces, particularly through non-invasive physiological sensing for neurorehabilitation.

EDUCATION

University of Washington, Seattle (UW) | PhD in Electrical & Computer Engineering Seattle, WA | 2020 -

Advisor: Samuel A. Burden

Concentration: Human-Machine Interaction, Multimodal User-Device Interface

Milestone: Passed the PhD Qualifying Exam May 2022

GPA: 3.99/4.00

University of California, Davis (UC Davis) | MS in Biological Systems Engineering Davis, CA | 2018 - 2020

Advisor: Farzaneh Khorsandi

Thesis: Develop an Autonomous All-Terrain Vehicle for Rollover Simulation

GPA: 3.94/4.00

University of California, Davis (UC Davis) | BS in Biological Systems Engineering Davis, CA | 2014 - 2018

GPA: 3.73/4.00

PUBLICATIONS

- P10. **Chou A. H.Y.**, Li S.J., Madduri M., Christensen A., Burden S. A., Orsborn A. L. Adaptation for myoelectric interfaces with eye tracking. *In preparation for ACM CHI Late Breaking Work 2023.*
- P9. **Chou A. H.Y.**, Yamagami M., Hutchison F., Burden S. A. Evaluation of multimodal human-machine interface in a novel visuomotor tracking task. *In preparation.*
- P8. 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.*
- P7. 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 preperation.* | [Link](#)
- P6. 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. Advancing Neurorehabilitation through Computational Modelling within a Patient-in-the-Loop Framework. *Under review in Journal of Neuroengineering and Rehabilitation.*
- P5. Pfister A., Madduri M., **Chou A. H.Y.**, Burden S. A. Matching User and Machine Learning Rates in Co-Adaptive Closed-Loop Myoelectric Interfaces. *Accepted to IEEE NER 2023.*
- P4. Peterson L. N., **Chou A. H.Y.**, Burden S. A., Yamagami M. Predictive Model of EMG and Manual Interfaces for Human Machine Interaction. *IFAC-PapersOnLine*, 55(41), pp.1-6. 2022. | [Link](#)
- P3. **Chou A. H.Y.**, 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](#)

- P2. **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](#)
- P1. **Chou H. Y.**, Khorsandi F. Developing and Testing a GPS-Based Steering Control System for an Autonomous All-Terrain Vehicle. *2020 ASABE Annual*. 2020. | [Link](#)

RESEARCH EXPERIENCES

University of Washington | Graduate Student Researcher

Seattle, WA | Sep. 2020 – Present

- Research focus: human-machine interaction, multimodal adaptive interface, sensorimotor control
- Thesis: Improving the usability of multimodal user-device interfaces with non-invasive physiological sensing for rehabilitation.
 - Using data-driven techniques to enhance interface adaptation for multimodal interaction with eye-tracking technology [P10].
 - Modeling human coordination of sensorimotor pathways in multimodal human-machine interfaces with surface electromyography (EMG) in continuous visuomotor tasks [P3 & P9].
 - Conducted human subject experiments to evaluate novel human-device interfaces.
 - Synthesized multi-behavioral legged robot using multi-objective optimization.
 - Analyzed learning dynamics of human-machine interaction using theory and algorithms from the domain of game theory, machine learning, and optimization.

UC Davis Machine Systems Lab | Graduate Student Researcher

Davis, CA | May 2018 – Sep. 2020

- Research focus: agricultural robotics, control theory
- Thesis: Develop an Autonomous All-Terrain Vehicle for Rollover Simulation
 - Developed a navigation and steering system for the autonomous ATV based on GPS RTK technology and image processing using Robotic Operation System (ROS) and OpenCV [P1 & P2].
 - Collaborated in over 5 projects, including developing the first ATV safety test station in the US, designing an ATV rollover simulator, designing a new chemical spraying system for orchards, and ATV safety for children.
 - Conducted field tests to evaluate ATV safety systems.

USDA APHIS Capstone Project | Undergraduate Researcher

Davis, CA | Dec. 2017 – June 2018

- Cooperated with USDA Animal and Plant Health Inspection Service (APHIS) to develop a novel solution of semi-autonomous temperature monitoring system of large-scale poultry compost windrows.
- Designed, built, and evaluated a scaled prototype with real-time temperature data acquisition ability, which was presented in the UC Davis Engineering Senior Design Showcase 2018 [T1].
- Skilled interpersonal communicator, managing the team in both one-on-one and group settings.

HONORS & AWARDS

UW ECE DEI Travel Award	April 2023
UW NeuroTechnology, Engineering & Computing (NeuroTEC) International Travel Award	April 2023
Fellow at the NSF Disability and Rehabilitation Engineering (DARE) Link	March 2023
UW ECE sponsorship for the Women in Science and Engineering (WiSE) Conference	February 2021
UC Davis Bio & Ag Engineering Graduate Student Fellowship	2018 - 2020
UC Davis Peter J. Shields and Henry A. Jastro Research Award	2019-2020
UC Davis Jastro-Shields Travel Award	April 2018
Robert Roy Owen Scholarship & Howard R. Murphy Scholarship	2017 - 2018
UC Davis Dean's Honor List in College of Engineering	2015, 16, 18

TEACHING

Engineering Design and Communication | Teaching Assistant Davis, CA | Fall 2019

- Organized and taught undergraduate engineering design and communication labs, studios, workshops, and office hours.
- Assisted in organizing the engineering 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.
- Organized office hours and provided guidance in students' class projects.

Classical Physics | Lab Teaching Assistant Davis, CA | Spring 2019

- Taught four undergraduate physics labs with a total of 80+ students.

INTERNSHIP

TacSense Inc. | Wearable Sensor Engineering Intern | [Link](#) Woodland, CA | Feb. 2016 - June 2018

- Mentors: Ben Bazor, Prof. Tingrui Pan
- Managed the creation and execution of a calibration and testing station for biomedical pressure sensor prototypes, including shop work such as electronic prototyping, woodworking, and metalworking.
- Developed CAD designs for demonstration, documentation, and rapid prototyping.
- Integrated sensors into wearable products and assisted in modeling prototypes for various applications.
- Troubleshooted production issues in two research and development projects including fluid pressure and material strength analysis.
- Visited three manufacturers in Shanghai and Shenzhen, China for business collaborations.

POSTERS & TALKS

- T11. Poster presentation at Neural Control of Movement (NCM) (April 2023) on *Uncontrolled manifold emerges from coordinated feedback in human-machine interaction*.
- T10. Lightning talk and poster presentation at UW ECE Research Showcase (March 2023).
- T9. Poster presentation at NSF Disability and Rehabilitation Engineering (DARE) conference: Modeling in Neurorehabilitation (Mar 2023) on *Uncontrolled manifold emerges from coordinated feedback in human-machine interaction*.
- T8. Paper presentation at IFAC Workshop on Cyber-Physical Human System (Dec 2022) on *Evaluating a Human/Machine Interface with Redundant Motor Modalities for Trajectory-Tracking*.
- T7. Poster presentation at UW WomXn at the Forefront of ECE Research (Dec 2021) on *Optimally Combine Sensorimotor Pathways in Human-Machine Task with Multiple Sensory Modalities*. | [Link](#)
- T6. Conference paper presentation at the Annual meeting of American Society of Agricultural and Biological Engineers (July 2020) on *Developing and Testing a GPS-Based Steering Control System for an Autonomous All-Terrain Vehicle*. | [Link](#)
- T5. Poster presentation at the ASABE CA-NV Section meeting in Tulare, CA (February 2020).
- T4. Conference paper presentation at the Annual meeting of American Society of Agricultural and Biological Engineers (July 2019) on *Developing and Testing an Autonomous All-Terrain Vehicle to Experimentally Test Rollover Incidents* | [Link](#)
- T3. Poster presentation at the International Society for Agricultural Safety and Health (ISASH) (June 2019) on *Developing an Autonomous All-Terrain Vehicle to Evaluate Performance of Crush Protection Devices in Rollover Incidents*.
- T2. Poster at UC Davis Picnic Day research showcase (April 2019).
- T1. Poster presentation at UC Davis Engineering Senior Design Showcase 2018 (June 2018) on *Semi-autonomous temperature monitoring system of large-scale poultry compost windrows*. | [Link](#)

MENTORING

Emmy Chow | PhD, UW BioRobotics Lab

Seattle, WA | Spring 2023 - Present

- Researching on sensorimotor integration in human-machine interaction.

Andrew Christensen | undergraduate

Seattle, WA | Spring 2023 - Present

- Researching on wearable sensing (EMG) in human-machine interaction with human subjects experiment.

Liya Hutchison | undergraduate, UW BioRobotics Lab

Seattle, WA | Winter 2023 - Present

- Poster presentation at the 2023 UW ECE WAFER conference.
- Researching on wearable sensing (EMG) in human-machine interaction with human subjects experiment.

Annika Pfister | undergraduate, UW Center for Neurotechnology Research (CNT) **Seattle, WA | Summer 2022**

- Researching on decoder adaptation rate in human-device interactions.
- Oral presentation at 2022 Center for Neurotechnology Research Experience for Undergraduates.
- Wrote a conference abstract, which was accepted by the IEE NER 2023 [P5].

Lauren Peterson | undergraduate, UW BioRobotics Lab

Seattle, WA | Winter - Spring 2021

- Researching and modeling human-machine interaction in a disturbance-rejecting task.

- 2022 [P4].

Seattle, WA | Summer 2021

- Poster presentation at 2021 Center for Neurotechnology Research Experience for Undergraduates.

PROFESSIONAL SERVICES & OUTREACH

Seattle, WA | Fall 2023

- (expected) with an aim to expand and improve DEI efforts at UW ECE.

Seattle, WA | Fall 2023 - Present

- ## Organizing monthly graduate student coffee chats for community building

Seattle, WA | Spring 2023 - Present

- Introduce speakers and moderate seminars.
Meet with the organizer team regularly, send out announcements, and update the website.

USC, CA | March 2023

- Moderated presentations and helped take notes as an NSF DARE fellow.

Seattle, WA | Winter 2022

- Hosted prospective students during the visit day.

Seattle, WA | Fall 2021, Fall 2022

- Mentored a total of six undergraduate students and assisted their applications to graduate schools.

Tulare, CA | February, 2020

- Presented posters and hosted a booth to promote Crash Protection Devices (CPD) for All-Terrain Vehicle (ATV) rollover crashes to researchers and farmers.

TECHNICAL SKILLS

Languages: English, Mandarin

Programming languages: Python, MATLAB, Latex

Developer Tools: ROS, OpenCV, Arduino IDE, Raspberry Pi, PLC, Labgraph (Meta), PyTorch

Softwares: SolidWorks, AutoCAD, Inkscape

Operating Systems: Microsoft Windows, macOS, Linux

Relevant Coursework: Linear and Nonlinear Control Theory, Game Theory, Reinforcement Learning, Optimization, Machine Learning, Computer Vision, Robotics and IoT, Statistic (Probability and Stochastic Processes), Scientific Computing, Data Analysis, Neural Engineering, Deep Learning for Neuroscience

REFERENCES

Samuel A. Burden (PhD advisor)

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University of Washington, Seattle
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Amy Orsborn

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University of Washington, Seattle
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Momona Yamagami

Assistant Professor, Electrical & Computer Engineering
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Farzaneh Khorsandi (MS advisor)

Assistant Professor of Cooperative Extension in Biological and Agricultural Engineering
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