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). I am interested in physiological sensings such as peripheral neural activities, eye movements, and gestures to understand users in **human-computer interaction** and leverage the knowledge to enhance interfaces for assistive devices and rehabilitation. My research utilizes data-driven algorithms, theoretical principles from control theory, and knowledge of human sensorimotor systems obtained through experimentation to advance the usability and generalizability of multimodal interfaces.

EDUCATION

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

Advisor: Samuel A. Burden

GPA: 3.99/4.00 | Passed the PhD Qualifying Exam May 2022

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-computer interaction, human-robot interaction, multimodal adaptive interfaces, sensorimotor systems
  - Designed and tested multimodal interface with surface electromyography (EMG) and eye-tracking that can adapt to individuals in diverse human-computer tasks like tracking, point-and-click, and letter writing. [P10].
  - Modeled the integration of human sensorimotor pathways in multimodal human-machine interfaces with EMG in continuous visuomotor tasks [P3 & P9].
  - Conducted human-subject experiments to evaluate novel human-computer 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: robotics, control theory
  - Developed a navigation and steering system for an autonomous All-Terrain Vehicle (ATV) based on GPS technology and image processing using Robotic Operation System (ROS) and OpenCV [P1 & P2].
  - Conducted outdoor field tests to evaluate the autonomous ATV and its safety systems.
  - 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.

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

Elevate Fellowship funds from Amazon	December 2023
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 multimodal sensing with EMG and eye tracking in human-machine interaction with human-subject experiments.

Liya Hutchison | undergraduate, UW BioRobotics Lab — Seattle, WA | Winter 2023 - Present

- Researching on wearable sensing with EMG in continuous tracking tasks.
- Poster presentation at the 2023 UW ECE WAFER conference.

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

- Evaluated interface 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

- Modeled human-machine interaction in a disturbance-rejecting task.
- Wrote a conference paper, which was accepted by the IFAC Workshop on Cyber-Physical Human Systems 2022 [P4].

Alexis Blakes | undergraduate, UW Center for Neurotechnology Research (CNT) Seattle, WA | Summer 2021

- Compared the signal quality of different EMG electrodes for a trajectory-tracking task.
- Poster presentation at 2021 Center for Neurotechnology Research Experience for Undergraduates.

PROFESSIONAL SERVICES & OUTREACH

Co-Chair, UW WomXn at the Forefront of ECE Research (WAFER) | **Link** Seattle, WA | Fall 2023

- Planned and organized the UW ECE WAFER conference in November 2023 with 100+ attendees with an aim to expand and improve DEI efforts at UW ECE.
- Inviting speakers including faculty and industry leaders in ECE and related fields from Amazon, Boeing, Impinj, Meta, and Microsoft.

Organizer, UW ECE Graduate Student Coffee Chat Seattle, WA | Fall 2023 - Present

- Organizing monthly graduate student coffee chats for community building.

Seminar Coordinator, DUB (Design, Use, Build) | **Link** Seattle, WA | Spring 2023 - Present

- Hosted and moderated the weekly DUB seminars with 70+ attendees from the HCI community.
- Meet with the organizer team regularly, send out announcements, and update the website.

Conference Moderator, NSF Disability and Rehabilitation Engineering (DARE) | **Link** USC, CA | March 2023

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

Student Host, UW ECE graduate student visit day Seattle, WA | Winter 2022

- Hosted prospective students during the visit day.

Mentor, UW ECE Graduate Application Support Program Seattle, WA | Fall 2021, Fall 2022

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

Outreach, World Agricultural Expo 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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Momona Yamagami
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Farzaneh Khorsandi (MS advisor)
Associate Professor of Cooperative Extension in Biological and Agricultural Engineering
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