Hao-Lun Hsu

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Education

Duke University — Durham, NC, USA
Ph.D. Computer Science — *Aug. 2022 – Present*

Georgia Institute of Technology — Atlanta, GA, USA
M.S. Biomedical Engineering — *Aug. 2019 – May 2021*

- Diversity Ambassador, Georgia Tech Student Diversity Program, 2020

National Taiwan University — Taipei, Taiwan
B.S. Mechanical Engineering — *Sep. 2014 – Jun. 2018*

Publications

Conference Papers

C1. P Sarikhani, **HL Hsu**, and B Mahmoudi*, "Automated Tuning of Closed-loop Neuromodulation Control Systems using Bayesian Optimization", in *44rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, 2022

C2. **HL Hsu**, Q Huang, and S Ha*, "Improving Safety in Deep Reinforcement Learning Using Unsupervised Action Planning", in *IEEE International Conference on Robotics and Automation (ICRA)*, 2022

C3. JH Chen, **HL Hsu**, WH Yang, YC Chen, and HM Hsiao*, "New Spherical Stent Concept for Occlusion", in *Annual Scientific Meeting of Taiwanese Society of Biomechanics*, 2017

Workshop Papers

W1. P Sarikhani, **HL Hsu**, JK Kim, S Kinzer, E Mascarenhas, H Esmaeilzadeh, and B Mahmoudi*, "Neuroweaver: Towards a Platform for Designing Translatable Intelligent Closed-loop Neuromodulation Systems", in *NeurIPS Research2Clinics Workshop*, 2021

W2. **HL Hsu**, Q Huang, and S Ha*, "Safe Exploration for Reinforcement Learning Using Unsupervised Action Planning", in *RSS Workshop on Integrating Planning and Learning*, 2021

Abstract

A1. P Sarikhani, **HL Hsu**, M Zeydabadinezhad, Y Yao, M Kothare, and B Mahmoudi*, "Sparc: Adaptive Closed-loop Control of Vagal Nerve Stimulation for Regulating Cardiovascular Function Using Deep Reinforcement Learning: A Computational Study", in *Neuroscience 2021, 50th Annual Meeting*, 2021

A2. P Sarikhani, **HL Hsu**, O Kara, JK Kim, H Esmaeilzadeh, and B Mahmoudi*, "Neuroweaver: A Platform for Designing Intelligent Closed-loop Neuromodulation Systems", in *4th International Brain Stimulation Conference*, 2021

A3. **HL Hsu**, "Functional Connectivity Correlates to Individual Difference in Human Brains during Working Memory Task and Resting State", in *IEEE EMBS North American Virtual International Student Conference*, 2021

Honors & Awards

NSF TAST-NRT Fellowship *, 1 of 6 awardees* Aug. 2022 - Jul. 2023

Ph.D. Departmental Fellowship *, Computer Science, Duke University* Aug. 2022 - Jul. 2024

Thank a Teacher Award *, Center of Teaching and Learning, Georgia Tech* Apr. 2021

Travel Grants for Ph.D. Fellowship workshop *, Hong Kong government* Jul. 2017

Material Innovation Award *, Material Research Society Taiwan* Oct. 2016

Third Prize *, Manufacturing Practice Competition, Mechanical Engineering, NTU* Jan. 2015

Research Experience

Duke University Durham, NC, USA
Graduate Research Assistant *Aug. 2021 – Present*
Advisor: Prof. Miroslav Pajic

- Developing conservative sequence modeling algorithm for offline Reinforcement Learning in dynamical and safety-critical systems
- Integrating Decision Transformer with off-policy evaluation for long horizon planning in deep brain stimulation

Emory University Atlanta, GA, USA
Graduate Research Assistant *Jan. 2021 – July 2022*
Advisor: Prof. Babak Mahmoudi

- Used Bayesian Optimization automated tuning PI controllers for closed-loop neuromodulation
- Suppressed pathologically synchronous neurons for Parkinson's via RL approaches
- Regulated cardiovascular system via vagus nerve stimulation with set-point control based RL
- Few-shot adaption from healthy to hypertension cardiac model via transfer learning

Georgia Institute of Technology Atlanta, GA, USA
Graduate Research Assistant *Jan. 2020 – Oct. 2021*
Advisor: Prof. Sehoon Ha

- Integrated on-policy RL agent with unsupervised action planning for safe exploration
- Deployed Augmented Random Search for training the power grid policy to adapt to less controllable renewables
- Sim-to-sim transfer for different power load with dynamic randomization

National Taiwan University Taipei, Taiwan
Undergraduate Research Assistant *Sep. 2015 – Sep. 2018*
Advisor: Prof. Hao-Ming Hsiao

- Designed a double spherical stent to reduce the blood flow volume by 44% for cerebral aneurysm treatment
- Invented a novel dural defect occluder to prevent bacterial meningitis and cerebrospinal fluid rhinorrhea after Expanded Endonasal Approach

Work Experience

Curai Health Palo Alto, CA, USA (Remote)
Machine Learning Research Intern *May 2022 – Sep. 2022*
Mentors: Dr. Anitha Kannan and Dr. Ilya Valmianski

- Built Decision Transformer for sequence modeling in medical history taking
- Interpreted the relationship between the sequence of queries and diagnosis
- Investigated the scalability and generalization of different RL algorithms

Reazon Holdings, inc. Tokyo, Japan (Remote)
Machine Learning Research Intern *Oct. 2021 – Dec. 2021*
Mentors: MD. Shubham Gupta and Dr. Daijro Mori

- Built ShuffleNet and GhostNet for gaze estimation and eye moving tracking on mobile devices improving upon published accuracy
- Adapted a Capsule Network to gaze estimation problem including eyes, face, and gray frame models and incorporated reconstruction loss to the original objective function
- Abstracted original PyTorch implementation via PyTorch Lightning

Abbott Vascular Taiwan Taipei, Taiwan
Software Engineering Intern *Jun. 2018 – July 2019*

- Built an administrative system to share information among marketing, sales, and finance departments, and improved 75% of operation time in the sales database of vascular products, facilitating fast targeting
- Forecasted vascular product marketing trend by digitizing routine documents and incorporated the original database with Power BI to provide interactive visualizations and business intelligence capabilities to create reports and dashboards

Academic Service

Paper Review: ICRA 2023
Research Proposal Review: PURA (President's Undergraduate Research Award) Fall 2022
Teaching Assistant: Network Science (Spring, Summer, and Fall 2022), Clinical Application of Medical Electronic Device (Fall 2017), Clinical Observation & Demands Exploration (Summer 2017)

Entrepreneurship & Innovation Experience

OpenEnded Philadelphia, PA, USA (Remote)
Founding Member *Aug. 2020 – Mar. 2021*

- Democratized career information to help east Asian college students painlessly and effortlessly imagine and plan for their future
- Conducted user interviews to investigate the difficulty why college students are not willing to actively make their career plans
- Designed the user interface for collecting user data via Adalo

Stanford Design Challenge Asia Taipei Taiwan
Finalist (8 out of 91) *Dec. 2016*

- Established a social platform for the elderly, including a pair of smart shoes as a medium, to inspire them to go outside and exercise

H. Spectrum Taipei, Taiwan
Trainee in leading health startup incubator/accelerator in Asia *Feb. 2016 – Jun. 2016*

- Developed a non-Newtonian fluid formulation to design wearable devices preventing hip fractures in the elderly

- Received training including clinical requirement, trial field, prototype, patent, regulation, and business models

Graduate Institute of Biomedical Electronics & Bioinformatics, NTU Taipei, Taiwan
Trainee in summer research bootcamp *Jul. 2015 – Aug. 2015*

- Designed an endotracheal tube to address blind insertion and airway difficulties

Talks & Presentations

Curai Health ML paper club (Invited Talk) *Jul. 2022*
Possible Reinforcement Learning Approaches to History Taking

Georgia Tech Robotics Research Showcase (Poster) *Mar. 2022*
Improving Safety in Deep Reinforcement Learning Using Unsupervised Action Planning

Artificial Intelligence Medicine Organization weekly webinar (Invited Talk) *Mar. 2021*
Applications of Reinforcement Learning in healthcare and power grid control

Prof. Constantine Dovrolis's research group (Invited Talk) *Feb. 2021*
Individual Difference in Humans' Brains from Functional Connectivity for Working Memory

Technical Skills

Programming: Python, MATLAB, C++, C#, Julia, VBA
OS: Linux (Ubuntu), Microsoft Windows, iOS
ML: Tensorflow, PyTorch, Keras, Scikit-learn, PyTorch Lightning
Simulation Environment: OpenAI Gym, Mujoco