Aaron T. Wang

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EDUCATION

Duke University, Durham, NC **Expected May 2027**
B.S.E in Electrical and Computer Engineering, Double Major in Computer Science
Coursework: Multivariable Calculus, Data Structures and Algorithms, Molecular Biology, Engineering Design and Communication

University of Utah, Salt Lake City, UT, 4.0 GPA **Aug. 2022 – May 2023**
Coursework: Multivariable Calculus, Linear Algebra, Introduction to Differential Equations, Introduction to Algorithms and Data Structures

Skyline High School, Salt Lake City, UT, *IB Diploma*, 3.98 GPA **Aug. 2019 – June 2023**
Awards and Honors: U.S. Presidential Scholar, Utah General Sterling Scholar, 6th Place Team at the November 2021 Harvard-MIT Math Tournament, 3rd Place Team in Division B at the 2022 American Regions Mathematics League National Competition, USA Computing Olympiad - Silver Division

Independent Study
CS 109 Introduction to Probability for Computer Scientists, by Stanford University, published online Summer 2023
CS 11-785 Introduction to Deep Learning, by Carnegie Mellon University, published online Summer 2022
6.036 Introduction to Machine Learning, by MIT OpenCourseware Spring 2022

SKILLS

Programming Languages: Python, Java, MATLAB, C++, C#, C, Arduino, HTML, CSS, JavaScript. Highly experienced in Python and MATLAB for machine learning.

Tools: TensorFlow, Keras, PyTorch, NumPy, Pandas, OpenCV, PyQt, Git, SolidWorks, Fusion360, Docker, Microsoft Office

PROJECTS

In-Context Learning with Transformers, *Carin Research Group, Duke University* **October 2023 – Present**
- Research applications of transformers and large-language models for in-context learning.

Computer Vision for Resident Education, *Brain Tool Laboratory, Duke University* **October 2023 – Present**
- Develop a computer vision pipeline to identify surgical tools and quantify surgical performance to improve surgical training.

Smart Control of Smart Devices, *Utah Neurorobotics Lab, University of Utah* **August 2022 – Present**
- Collaborate with undergraduate and Ph.D. students to develop a novel joint classification-regression machine learning algorithm, integrating convolutional neural networks and Kalman filters, with electromyography signals as input, to enable people with neuromuscular disabilities to control a smart-home environment with intuitive hand gestures.

Liquid Neural Networks for EMG Classification, *Utah Neurorobotics Lab, University of Utah* **June 2023 – September 2023**
- Create a machine learning pipeline, using Python and MATLAB, that uses liquid time-constant networks to classify gestures based on EMG signals.

Trial-by-Trial Alignment of EMG Signals, *Utah Neurorobotics Lab, University of Utah* **September 2022 – Present**
- Develop an algorithm that aligns electromyography signals with individual intended kinematic movements. Compare impact of global and trial-by-trial shifts of EMG signals on convolutional neural network and Kalman filter performance.

Classification of Activities of Daily Living, *Utah Neurorobotics Lab, University of Utah* **June 2023 – August 2023**
- Worked with undergraduate and Ph.D. students to create a machine learning pipeline to process and classify EMG data from the wrist, forearm, and bicep, using a convolutional neural network. Incorporated Gram-Schmidt algorithm to select EMG channels with highest predictive power.

RESEARCH EXPERIENCE

Carin Research Group, *Research Assistant* **October 2023 – Present**
- Study variational autoencoders for causal inference and transformers for in-context learning.

Brain Tool Laboratory, *Research Assistant* **October 2023 – Present**
- Utilize machine learning and computer vision to improve surgical training.

Utah Neurorobotics Lab, *Research Assistant* **June 2022 – Present**
- Research and develop novel machine learning algorithms to improve assistive devices for people with neurological disorders.

Utah Transportation Research and Artificial Intelligence Lab, *Research Assistant* **June 2021 – Aug. 2022**
- Worked with a team of Ph.D. students and postdocs to code and train a graph convolutional network long short-term memory (GCN-LSTM) model to forecast and analyze the impact of COVID-19 on traffic volume in Utah.

JOURNAL PUBLICATIONS

1. Yaobang Gong, Tanner Isom, Pan Lu, Xianfeng (Terry) Yang, & **Aaron T. Wang**, (2022), "Modeling the Impact of COVID-19 on Transportation at a Later Stage of the Pandemic: A Case Study of Utah," Journal of Intelligent Transportation Systems: Technology, Planning, and Operations, DOI: https://doi.org/10.1080/15472450.2022.2157212.

CONFERENCE PRESENTATIONS

1. **Aaron T. Wang**, Connor D. Olsen, W. Caden Hamrick, & Jacob A. George, (2023), "Correcting Temporal Inaccuracies in Labeled Training Data for Electromyographic Control Algorithms," IEEE International Conference on Rehabilitation Robotics, Podium, DOI: https://doi.org/10.1109/ICORR58425.2023.10304728.
2. Abigail R. Citterman, Abigail T. Harrison, Rebecca J. Urban, Kaysen K. Hansen, Marshall A. Trout, **Aaron T. Wang**, Marta M. Iversen, & Jacob A. George, (2023), "Transcutaneous Electrical Nerve Stimulation at the Wrist to Restore Sensory Feedback for Individuals with Partial Hand Amputation," American Orthotic and Prosthetic Association National Assembly, Poster, DOI: https://doi.org/10.13140/RG.2.2.11191.70565.
3. Sophie E. Nelson, Mingchuan Cheng, **Aaron T. Wang**, Connor D. Olsen, & Jacob A. George, (2023), "Classification of Activities of Daily Living from Muscle Activity," University of Utah Summer Research Symposium, Poster.
4. **Aaron T. Wang**, Connor D. Olsen, Abigail R. Citterman, & Jacob A. George, (2022), "A Reusable, Low-Cost Wristband for Quick Application of Transcutaneous Stimulation," University of Utah Summer Research Symposium, Poster.
5. Yaobang Gong, Tanner Isom, Pan Lu, Xianfeng (Terry) Yang, & **Aaron T. Wang**, (2022), "Modeling the Impact of COVID-19 on Transportation at a Later Stage of the Pandemic: A Case Study of Utah," 101st Transportation Research Board Annual Meeting, Poster, #22-01838.

LEADERSHIP EXPERIENCE

Artificial Intelligence Club, Skyline High School, *Founder, President* **Aug. 2021 – June 2023**

- Introduced members to various machine learning algorithms and current research through hands-on projects, with the goal of inspiring students to further explore AI and machine learning.

Utah American Regions Mathematics League (ARML) Team, *Co-captain* **Mar. 2019 – June 2023**

- Led team members at weekly practices by presenting solutions and tutoring small groups of students.
- Organized and planned team strategy at competitions.
- Mentored eight middle school students during the summer, guiding them through advanced math concepts as an introduction to high school math competitions.

Math Club, Skyline High School, *President* **Aug. 2019 – June 2023**

- Recruited new members, doubling membership and participation in competitions.
- Organized weekly lessons on new or advanced math concepts to prepare members for upcoming math competitions.
- Coordinated with advisor to secure funding for contests.

Utah Science and Engineering Fair Student Advisory Board, *Board Member* **May 2022 – June 2023**

- Hosted science fair outreach events to increase participation and interest, including monthly science bowls, science writing competitions, and a science carnival.
- Created lectures and presentations to introduce middle school and high school students to the science fair process.
- Organized fundraising events for the science fair.