MATTHEW H. TAYLOR

✉ mat028@ucsd.edu | 🔗 mht3.github.io

Research Interests

Data-driven control, science/physical applications of reinforcement learning and imitation learning, developing learning algorithms for high-dimensional systems by leveraging insights from control theory and physics.

EDUCATION

Ph.D. in Computer Science and Engineering Sept. 2025 – Est. June 2029
University of California, San Diego, GPA: 4.0

M.S. in Computer Science and Engineering Sept. 2023 – June 2025
University of California, San Diego, GPA: 4.0

B.S. in Aerospace Engineering Aug. 2019 – May 2023
University of Illinois at Urbana-Champaign, GPA: 3.93

RESEARCH AND WORK EXPERIENCE

UC San Diego La Jolla, CA, USA
Graduate Researcher March 2024 –
Advisor: Sicun Gao

- Improving learning-based design for high dimensional control problems using ideas from Lyapunov stability, imitation learning, and learning from imperfect experts.
- Creating more stable, robust policies for the Unitree G1 humanoid robot for balance and locomotion tasks.
- Created an approximate neural Lyapunov controller for pendulum and cartpole gymnasium environments with the goal of expanding and generalizing to problems with larger state spaces and unknown dynamics.

NASA Jet Propulsion Laboratory Pasadena, CA, USA
Machine Learning Research Intern June 2024 – Nov. 2024

- Leveraged self-supervised contrastive learning techniques to create an ocean synthetic-aperture radar foundation model and finetuned on ocean science object detection and semantic segmentation tasks.
- Developed a versatile, dataset and model-agnostic semantic segmentation and object detection training codebase with integration of Weights and Biases for visualizing and monitoring model performance.
- Curated a dataset with bounding box and polygon mask annotations for over 7,000 submesoscale ocean eddies in the western Mediterranean Sea and prepared for NASA PO.DAAC (oceanography data archive).

Dolby Laboratories San Francisco, CA, USA
Computer Vision/Machine Learning Engineer Intern June 2023 – Aug. 2023

- Profiled video content using skin segmentation, noise, face, and text detection models to give suggestions for when to use precision detail, a local image adjustment algorithm created for Dolby Vision.
- Updated Dolby Vision's internal C++ to Python bridge by adding hooks for local enhancement parameters and produced a modular PyQt GUI to visualize content mapped Dolby Vision content and recommendations.

Maxar Technologies (now Vantor) Westminster, CO, USA
Research and Development Intern May 2022 – Aug. 2022

- Applied deep learning and semantic segmentation methods to detect building footprints from high-resolution and multispectral satellite imagery using PyTorch for training.
- Researched how the addition of the near infra-red band (NIR) improves segmentation performance.
- Developed model-agnostic visualizations in TensorBoard for the R&D Lab's custom training framework.

University of Illinois at Urbana-Champaign Champaign, IL, USA
Undergraduate Researcher May 2021 – May 2023
Advisor: Huy Tran

- Created a CNN to detect objects and transform a robot's camera view into a top-down grid world in simulation using Gazebo and ROS and deployed in the real-world using the NVIDIA JetBot AI kit.
- Explored useful applications for brain computer interfaces and human-agent teaming, applying machine learning algorithms to EEG data to improve a human-agent collaborative environment.
- Created an experiment with multiple participants and developed a multiclass SVM to classify LEDs flashing at different frequencies based on EEG signals using steady-state visual-evoked potentials.

TEACHING

University of California, San Diego
Computer Science and Engineering Department

- *Teaching Assistant*, AI Search and Reasoning (CSE 150B) March 2025 – June 2025
- *Teaching Assistant,* Search and Optimization (CSE 257) Jan. 2025 – March 2025
- *Mentor TA*, Teaching Methods in Computer Science (CSE 599) Sept. 2024 – Dec. 2024
- *Teaching Assistant*, Intro to Programming (CSE 8A) Jan. 2024 – March 2024

AWARDS

- Summa Cum Laude in Aerospace Engineering at University of Illinois at Urbana-Champaign (2023)
- James Scholar at University of Illinois at Urbana-Champaign (2020-2023)
- State Farm National Merit Scholar (2019)

PUBLICATIONS [Google Scholar]

*Equal Contribution

1. Taylor, M.H., "Advantage Regularization for Imitating Complex Control Policies", MS Thesis, University of California, San Diego, 2025.

RELEVANT COURSEWORK

University of California, San Diego

- Search and Optimization (CSE 257)
- Algorithms (CSE 202)
- Machine Learning for Physical Applications (ECE 228)
- Random Processes (ECE 250)
- Parallel Computing (CSE 260)
- Introduction to Robotics (CSE 276A)

University of Illinois at Urbana-Champaign

- Machine Learning (CS 446)
- Introduction to AI (CS 440)
- Probability and Statistics (CS 361)
- Numerical Methods (CS 357)
- Aerospace Control Systems (AE 353)

- Autonomous Systems Lab (AE 483)
- Aerospace Dynamical Systems (AE 352)

TECHNICAL SKILLS

- Python
- C
- C++
- Java
- Git
- Unix
- IsaacLab
- Mujoco
- PyTorch
- TensorFlow

COMMUNITY SERVICE

Volunteer Dog Walker — Del Mar, CA, USA
Del Mar Dog Rescue — 2024 –

- Volunteered to walk dogs at a local rescue on weekends.

Softball Coach — Bloomington, IL, USA
Special Opportunities Available in Recreation — 2017 – 2019

- Coached children and adults with disabilities in a yearly softball league.

Buddy — Normal, IL, USA
The Miracle League of Central Illinois — 2017 – 2019

- Helped children and adults with disabilities experience the joy of playing baseball.