Brandon Woodward

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EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Master's in Artificial Intelligence Engineering – Mechanical Engineering — May 2025

- Coursework: Robot Learning, Modern Control Theory, Gen AI and LLMs, Robot Dynamics and Analysis, Optimal Control and RL, Vision Language Planning, Gen AI, Data Driven AI for Modeling and Control of Dynamical Systems

Georgia Institute of Technology — Atlanta, GA
Bachelor's in Mechanical Engineering — December 2022

- Minor in Robotics with coursework in machine learning, robotics, and controls

INTERNSHIP EXPERIENCE

Neura Robotics — Metzingen, Germany
Humanoid Robot Artificial Intelligence Intern — June 1, 2024 – December 1, 2024

- Developed and trained a new multi-task locomanipulation AI controller using tools such as pytorch, transformers, and IsaacSim
- Assisting in expanding and improving stability of the existing controllers both teleoperation and autonomous operation
- Designed and implemented custom simulation environments in IsaacSim for training RL models across multiple robots
- Developed and tested both offline and online reinforcement learning models in simulation for multi-task humanoid control
- Deployed demonstrations of existing humanoid AI models, debugging physical/electrical issues to ensure smooth operation.

Area I / Anduril — Kennesaw, GA
Software Engineering Intern — May 2022 - August 2022

- Tested data transmission between proprietary hardware and software via byte decoding, ensuring data integrity
- Developed automated testing systems to verify hardware in C++, improving efficiency and accuracy
- Created a GUI to control and test payloads using PyQT, streamlining payload testing processes

IHMC Robotics — Pensacola, FL
Software Integration Intern — May 2021 - August 2021

- Helped develop controls infrastructure in Java for a load bearing exoskeleton, allowing for basic locomotion
- Created 3D models of robots in RViz using ROS and urdf files, allowing for accurate simulations

SCHOOL PROJECTS

Resource Constrained Quadrupedal Model Predictive Control — Pittsburgh, PA
Course project for Optimal Control and Reinforcement Learning — January 2025 - May 2025

- Created optimal open loop gait trajectories using MujocoMPC for the Bittle quadruped
- Designed a resource constrained feedback controller using TinyMPC

NeurMPC — Pittsburgh, PA
Course project for Data Driven AI for Modeling and Control of Dynamical Systems — April 2024 - May 2024

- Used MPC to control firing rates of PV and Pyr neurons using the Ray driven NEURON simulator

Humanoid Whole-Body Control via Transformer — Pittsburgh, PA
Course project for Intro to Robot Learning — April 2024 - May 2024

- Implemented RL on the H1 unitree using TD-MPC2 on the Humanoidbench environment github repository
- Created a transformer to learn state, q-value, action, and reward using AWS decreasing train time by 60%

AI Poker Bot — Pittsburgh, PA
Hackathon hosted by the CMU Poker Club — March 2024

- Coded a poker AI on a custom variant of poker in 24 hours, trained using Generalized Advantage Estimation (GAE)

Tesla Model 3 Controllers — Pittsburgh, PA
Course project for Modern Control Theory — October 2023 - December 2023

- Implemented PID, Pole placement, and LQR with an Extended Kalman Filter controllers on a Webots simulation

Network Attack Predictor — Pittsburgh, PA
Course project for Systems and Toolchains for AI — October 2023 - December 2023

- Used Dynamo DB to create a SQL database and trained ML models on GCP to predict network attacks with up to 95% accuracy

RESEARCH EXPERIENCE

Carnegie Mellon Bot Intelligence Group (BIG) — Pittsburgh, PAa
Master's Researcher — January 2025 - Ongoing

- Developing a reinforcement learning algorithm for optimizing robotic painting manipulation tasks using PyTorch
- Incorporated CLIP, GANs, SDS loss, CNNs, and curriculum learning for policy refinement and sim-to-real transfer
- Handled multi-modal data input (image and text-based prompts + image feedback) to robotic action output

Georgia Tech EPIC Lab — Atlanta, GA
Undergraduate Researcher — August 2021 - May 2022

- Tuned LABView control algorithm for a lower back exoskeleton to be applied in live tests
- Designed and assembled exoskeleton hardware, reducing the mass by along with running testing procedures

Georgia Tech LIDAR Lab — Atlanta, GA
Undergraduate Researcher — August 2020 - May 2021

- Designed tarsal segments in SOLIDWorks to attach to a foot on Cassie, a bipedal robot, improving stability
- Redesigned and manufactured new prototypes based on test results over several iterations

LEADERSHIP

Techspark Student Worker - Pittsburgh, PA — August 2023 – May 2024, Jan 2025 – May 2025
- Advised in the design and creation of student projects in the Carnegie Mellon Techspark Makerspace

Master's Representative, MechE Graduate Student Organization - Pittsburgh, PA — August 2023 – May 2024
- Voicing concerns of master's students to the organization, ensuring equal representation to PhDs

Executive Officer, Yellow Jacket Archery Club - Atlanta, GA — January 2021 - December 2022
- President: Lead fellow officers to maintain stability and improve conditions — May 2022 - December 2022
- Previous positions: Equipment Manager and Historian — December 2020 - May 2022
- Coached as a level 2 instructor and level 1 judge under USA Archery

Peer Instructor, The Hive Makerspace - Atlanta, GA — January 2021 - December 2022
- Supervising 3D printing, woodworking workshop, and soldering equipment available to the student body
- Instructed people how to use all tools located in the interdisciplinary workspace safely

Undergraduate Teaching Assistant, ME 2110 Creative Decisions and Design - Atlanta, GA — January 2021 - May 2022
- Taught and supervised students using various power tools and machining techniques
- Mentored student design of robots for unique competitions planned each semester

SKILLS

Software: Python, C++, Java, Git version control, IsaacSim, Unity, ROS, Multithreading, PyTorch, TensorFlow, WandB, Tensorboard
RL + Controls: PPO, SAC, TD-MPC2, Online/Offline RL, Curriculum Learning, Domain Randomization, LQR, MPC, Kalman Filter
ML Pipeline: Spark, Hadoop, DynamoDB, SQL, Pandas, AWS, GCP, Docker, Kubernetes, containerization, CI/CD, GithubActions
Hardware: RasPi, Arduino, Up2 Computer, T-motors, Futek load cells, CAN and Serial Communication
Manufacturing: Band Saw, Miter Saw, Dremel, CNC Router, Laser Cutter, 3D Printer, Plasma Cutter, Manual Mill and Lathe
Languages: Native English and native Spanish speaker, novice German speaker