Cole Johnson

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EDUCATION

GEORGIA TECH | MS in CS
Comp. Perception & Robotics
Graduate Thesis | 4.0 GPA | May 2025
Co-Advised by Dr. Aaron Young & Dr. Matthew Gombolay

GEORGIA TECH | BS in CS
Theory & Intelligence
Highest Honors | May 2024

AWARDS

Best Paper Award, ISMR '23
Summer Research Fellowship, Caltech '24
Presidential Undergraduate Research Award, Georgia Tech '24 & '22

COURSEWORK

GRADUATE

Automata & Complexity Theory
Natural Language Processing
Randomized Algorithms
Artificial Intelligence
Machine Learning
Computer Vision

UNDERGRADUATE

Computational Foundations of ML
Advanced Linear Algebra
Real & Complex Analysis
Robotic Perception
Modern Algebra
Number Theory

PATENTS

0336823 Real-Time Adaptive Content Generation with Dynamic Sentiment Pred.
[Published] Self-Learning Framework for Predictive Topographic Modeling

RESEARCH

CALTECH AMBER LAB | Visiting Research Fellow
Jun – Sep 2024

- Researched RL-based trajectory tracking for bipedal, quadrupedal, and hopper robotic controls.
- Used MPC to plan obstacle-avoidant paths using learned tube dynamics in high-dim. robotic systems.

GEORGIA TECH EPIC LAB | Grad. Research Assistant
Jan 2021 – Present

- **Masters**: Researching end-to-end neural networks for task-agnostic upper-limb robotic control.
- **Undergraduate (President of Undergrad. Research)**: Researched continual and transfer learning approaches for use in lower-limb prosthetic control systems for intent recognition and context estimation.

INDUSTRY

LEVITREE | Cofounder & Head of Software Engineering
Jan 2021 - Present

- Lead team of embedded system, simulation, and data analytics developers to complete numerous projects.
- Dual aims of permanent carbon sequestration and flood prevention through subterranean wood injection for non-disruptive property elevation.

OPTIMAL DYNAMICS | AI Research Intern
Jan – Aug 2023

- Worked on team to implement hierarchical reinforcement learning algorithm for route planning based on literature. Owned model drifting analysis, designed and implemented online model fine-tuning for route planning system.

PROJECTS & VOLUNTEERING

ICARUS: BIPEDAL ROBOT | Independent Project
Dec 2022 – Present

- Designed from scratch, fabricated alone, implemented low level controls for, and built test rigs for hip-down bipedal robot.

INVENTION STUDIO @ GEORGIA TECH | CNC Instructor
Apr 2021 – Present

- Certified instructor on 5-axis CNC mill, industrial laser cutter, 3-axis CNC lathe, industrial waterjet, various 3D printers (SLS, SLA, FDM), TIG welding, etc.

SKILLS

COMPUTING

Data Science
Numpy | Pandas | TensorFlow | PyTorch | Wandb
Simulation
IsaacSim | Mujoco | Pinocchio | Simulink | OpenSim
Languages
Python | Matlab | C | C++ | C# | Java | JavaScript
Cloud
AWS | Azure | MongoDB | Balena | InfluxDB

ENGINEERING

Fusion 360 CAD & CAM
SolidWorks CAD
Ansys FEA & CFD
Altium & EasyEDA
JLCPCB & PCBWay

FABRICATION

3 & 5-Axis CNC Milling
3 & 5-Axis Waterjetting
Manual Milling
Mig & Tig Welding
FDM & SLA 3D Printing

RESEARCH CONTRIBUTIONS

JOURNAL PUBLICATIONS

[J1] Cole Johnson, Jairo Maldonado-Contreras, and Aaron J. Young
Real-Time Balancing of Stability and Plasticity in Continual Learning: Application to Speed Estimation for Lower-Limb Prostheses
In Review - Transactions on Medical Robotics & Bionics, 2024.

[J2] Jairo Maldonado-Contreras, Cole Johnson, Sixu Zhou, Hanjun Kim, Ian Knight, Kinsey R. Herrin, and Aaron J. Young
Real-time Adaptation of Deep Learning Walking Speed Estimators Enables Biomimetic Assistance Modulation in an Open-Source Bionic Leg
In Review - Transactions on Biomedical Engineering, 2024.

CONFERENCE PUBLICATIONS

[C1] William D. Compton, Noel Csomay-Shanklin, Cole Johnson, and Aaron D. Ames
Dynamic Tube MPC: Learning Error Dynamics with Massively Parallel Simulation for Robust Safety in Practice
In Review - International Conference on Robotics and Automation, 2025.

[C2] Jairo Maldonado-Contreras, Cole Johnson, Ian Knight, Sixu Zhou, Hanjun Kim, Kinsey R. Herrin, and Aaron J. Young
Transfer Learning for Efficient Walking Speed Estimation Across Novel Prosthetic Devices and Populations
In Review - International Conference on Robotics and Automation, 2025.

[C3] Cole Johnson, Jairo Maldonado-Contreras, and Aaron J. Young
Accelerating Constrained Continual Learning with Dynamic Active Learning: A Study in Adaptive Speed Estimation for Lower-Limb Prostheses
International Symposium on Medical Robotics, June 2024. [Paper]

[C4] Cole Johnson, Jeongwoo Cho, Saketh Chaluvadi, Jairo Maldonado-Contreras, and Aaron J. Young
Adaptive Lower-Limb Prosthetic Control: Towards Personalized Intent Recognition & Context Estimation
International Symposium on Medical Robotics, April 2023. [Paper]

CONFERENCE PRESENTATIONS & POSTERS

[P1] **Real-Time Balancing of Stability and Plasticity in Continual Learning: Application to Speed Estimation for Lower-Limb Prostheses**
International Symposium on Medical Robotics, June 2024.

[P2] **Accelerating Constrained Continual Learning with Dynamic Active Learning: A Study in Adaptive Speed Estimation for Lower-Limb Prostheses**
International Symposium on Medical Robotics, June 2024.

[P3] **Adaptive Lower-Limb Prosthetic Control: Towards Personalized Intent Recognition & Context Estimation**
International Symposium on Medical Robotics, April 2023.

[P4] **Reinforcement Learning-Based Trajectory Tracking in Massively Parallelized Simulations & Deep Tube MPC for Safe Route Planning**
Caltech Symposium of Faculty & Students (Summer Research Report), August 2024.

IN-PROGRESS

[I1] **Proximity & Force Perception-Based Grasping & Upper-Limb Biomechanics Task-Specific Dataset**
EPIC Lab @ Georgia Institute of Technology

[I2] **Task-Based Imitation Learning for Upper-Limb Robotic Control**
EPIC Lab @ Georgia Institute of Technology

REVIEWER

Journals
- Robotics and Automation Letters (RA-L)

Conferences
- International Conference on Robotics and Automation (ICRA)
- International Symposium on Medical Robotics (ISMR)