

Carlos A. Carrasquillo Torres

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Education

Georgia Institute of Technology | GPA: 3.9 / 4.0

- PhD, *Robotics*
- Master of Science, *Computer Science*, Machine Learning Specialization
- Master of Science, *Aerospace Engineering*

Aug 2021 – Present

Expected Summer 2026
May 2025
May 2025

University of Florida | GPA: 3.7 / 4.0

- Bachelor of Science, *Mechanical Engineering*, Magna Cum Laude Honors
- Bachelor of Science, *Computer Engineering*, Magna Cum Laude Honors

Aug 2017 – May 2021

May 2021
May 2021

Research Experience

Graduate Research Assistant

Aug 2021 – Current

Institution: Georgia Institute of Technology, Institute for Robotics and Intelligent Machines

Location: Atlanta, GA

Lab: DART Lab and EPIC Lab

Advisors: Anirban Mazumdar, PhD, Aaron Young, PhD

Dissertation Research:

- Engineered exoskeleton orthoses and mechatronics.
- Conceptualized and validated exoskeleton controllers:
 - Obstacle avoidance and navigation in low-visibility conditions [J3]
 - Impedance-based controllers for traditional exoskeleton control [J1]
 - End-to-end biological torque exoskeleton controllers
 - Uncertainty-aware exoskeleton torque controllers
- Used deep learning-based methods such as:
 - TCNs for end-to-end exoskeleton biological moment estimators from exoskeleton data
 - VQ-VAEs to construct a human motion primitive library from biomechanical data
 - CNNs for ground reaction force estimation from force-sensing insole data
 - GANs for domain adaption between two distinct exoskeleton sensor datasets
 - Transformers for full-body kinematics estimation from exoskeleton data
 - Proximal Policy Optimization (PPO) to teach AI agents to avoid obstacles
- Led the development of (or made significant contributions to) the following pieces of software:
 - Virtual reality games to simulate unstructured and dynamic environments for obstacle avoidance
 - Machine learning training package for human physiological state estimation
 - Low-level sensor libraries for real-time exoskeleton control
 - Exoskeleton control framework, graphical user interface, and command line tools
 - Bio-feedback mechanisms for the Meta Quest 3S, including an avatar that estimate arm kinematics from hand location (using inverse kinematics) and lower limb kinematics from wearable sensor data
- Conducted human-subject experiments using:
 - Delsys electromyography
 - Vicon motion capture
 - COSMED and Parvo metabolics

Miscellaneous Research Projects:

- *Microprocessor Knee (MPK) Recommendation Algorithm:* Developed an algorithm to identify the best commercial microprocessor knee for a transfemoral amputees. This algorithm aims to assist clinicians in their evaluation in the absence of expensive laboratory equipment [J2].
- *Bioreactor Control Box:* An electronics box designed to interface with all of the necessary pumps and sensors in a closed-loop bioreactor. Control box designed to meet clean room specifications. Enclosure designed in Solidworks. PCB designed in Altium Designer.



Undergraduate Research Assistant

Jan 2019 – Aug 2021

Institution: University of Florida, Department of Mechanical and Aerospace Engineering

Location: Gainesville, FL

Lab: ADAMUS Lab

Advisor: Riccardo Bevilacqua, PhD

Bachelor's Thesis Work:

- Developed embedded C++ avionics software for the D3 CubeSat, creating custom libraries to interface with the satellite's IMU, antenna, radio, and GPS on a BeagleBone Black microcomputer [C1, C2].
- Engineered a ground station application in Python to manage mission operations, including transmitting telecommands and receiving downlinked data from the satellite.

Publications

- [J4] K. L. Scherpereel, M. C. Gombolay, M. K. Shepherd, **C. A. Carrasquillo**, O. T. Inan, A. J. Young. "Deep Domain Adaptation Eliminates Costly Data Required for Task-Agnostic Wearable Robotic Control". Science Robotics. 2025. (Submitted)
- [J3] **C. Carrasquillo**, A. Bajpai, D. Iyengar, K. Collins, A. Mazumdar, A. Young. "[Enhancing Human Navigation Ability Using Force-Feedback from a Lower-Limb Exoskeleton](#)". IEEE Transactions on Haptics. 2025.
- [J2] **C. Carrasquillo**, S. Zhou, W. L. Childers, A. Young, K. Herrin. "[A Clinical Decision-Making Algorithm for the Personalized Prescription of Microprocessor-Controlled Prosthetic Knees: An Evidence-Based Approach based on a Randomized Trial](#)". Prosthetics and Orthotics International. 2025.
- [J1] A. Bajpai, **C. Carrasquillo**, J. Carlson, J. Park, D. Iyengar, K. Herrin, A. Young, A. Mazumdar. "[Design and Validation of a Versatile High Torque Quasi-Direct Drive Hip Exoskeleton](#)". IEEE Transactions on Mechatronics. 2023.
- [C2] **C. Carrasquillo**. "[A Versatile and Open-Source Radio Framework for the D3 CubeSat Mission](#)". Small Satellite Conference. 2021. Student Competition Best Paper Honorable Mention.
- [C1] S. Buckner, **C. Carrasquillo**, M. Elosegui, R. Bevilacqua. "[A Novel Approach to CubeSat Flight Software Development Using Robot Operating System \(ROS\)](#)". Small Satellite Conference. 2020. Poster Presentation.

Presentations

- [P5] K. Herrin, **C. Carrasquillo**, S. Zhou, W. L. Childers, A. Young. "A Clinical Decision Equation for the Personalized Prescription of Prosthetic Microprocessor Knees". The American Orthotic and Prosthetic Association. September 2024.
- [P4] **C. Carrasquillo**, K. Herrin, S. Zhou, W. L. Childers, A. Young. "Toward data driven prescription personalization of microprocessor prosthetic knees". Military Health System Research Symposium. August 2024.
- [P3] **C. Carrasquillo**, "Towards Functional Exoskeleton Control". The National Defense Science and Engineering Graduate Fellowship Conference. July 2024.
- [P2] **C. Carrasquillo**, "Enhancing Human Navigation Ability Using Active Wearable Exoskeletons". Sloan UCEM Conference. April 2024.
- [P1] **C. Carrasquillo**, A. Bajpai, D. Iyengar, K. Collins, A. Mazumdar, A. Young. "Enhancing Human Navigation Ability Using an Active Wearable Exoskeleton". American Society of Biomechanics. August 2023.



Industry Experience

Intern—Computer Science / Mechanical Engineering

May 2021 – May 2022

Company: Raytheon Intelligence & Space

Location: Dallas, TX

Supervisors: Chris Bender, Malia Kawamura

- Developed a MERN stack web application to help engineers find components on printed circuit boards by search and mouseover.
- Designed 5 Splunk dashboards and developed 10 process programs for production-grade machinery.
- Engineered a VBA-based desktop application to automate the logging and tracking of material testing data, replacing a manual process.

Teaching Experience

Mentor—Vertically Integrated Projects (VIP)

Aug 2021 – Current

Institution: Georgia Institute of Technology, Institute for Robotics, and Intelligent Machines

Location: Atlanta, GA

Professor: Aaron Young, PhD

Team: Robotic Human Augmentation

Led and mentored a team of 16 undergraduate students performing research in the following areas:

- Designing exoskeleton hardware, including orthosis and mechatronics
- Creating exoskeleton controllers, from traditional impedance control to more recent, deep learning-based strategies
- Conducting human-subject experiments
- Performing biomechanical analysis, including Vicon processing, OpenSim, and data-driven strategies
- Developing virtual reality games for demonstration and experimentation
- Developing energetically optimal path planning algorithms for human navigation

Senior Teaching Assistant—Design and Manufacturing Lab

May 2019 – May 2021

Institution: University of Florida Dept. of Mechanical and Aerospace Engineering

Location: Gainesville, FL

Professor: Mike Braddock

- Instructed over 30 students (in groups of 4-5 each semester) on design for manufacturing (DFM) principles, conducting design reviews and providing feedback on CAD models and technical drawings.
- Trained and certified students on shop equipment, including lathes, mills, welders, waterjets, and CNC machines.
- Managed and supervised a university machine shop, assisting researchers and design teams with part fabrication.
- Held quarterly seminars on advanced manual machining methods.
- Provided mentorship and instruction incoming teaching assistants to prepare them to lead their own sections.

Teaching Assistant—Dynamics and Control Systems Design Lab

Aug 2020 – Dec 2020

Institution: University of Florida Dept. of Mechanical and Aerospace Engineering

Location: Gainesville, FL

Professor: Prabir Barooah, PhD, Shannon Ridgeway, PhD

- Lectured to students on applying classical control theory to real-world systems, guiding them through system identification, PID controller implementation on microcontrollers, and computer vision algorithm development.
- Instructed students on using LabVIEW for the design and control of actuated closed-loop systems.



Teaching Assistant—Thermal Sciences Design and Lab

Aug 2020 – Dec 2020

Institution: University of Florida Dept. of Mechanical and Aerospace Engineering

Location: Gainesville, FL

Professor: John Abbitt, PhD

- Lectured and instructed students on the thermodynamics and operating principles of internal combustion engines.
- Guided student teams in designing mathematical models for internal combustion engines for the class final project through brainstorming and design review sessions.
- Prepared students for exams by conducting comprehensive in-class review sessions.

Teaching Assistant—Numerical Methods

May 2019 – Aug 2020

Institution: University of Florida Dept. of Mechanical and Aerospace Engineering

Location: Gainesville, FL

Professor: Jonathan Brooks, PhD, Georges Akiki, PhD

- Lectured on topics including iterative algorithms, linear algebra, numerical derivatives and integrals, Fourier analysis, polynomial regression, and splines.
- Created homework solutions, including answer keys, example software solutions, and grading rubrics.
- Prepared and presented in-class exam reviews.

Fellowships and Awards

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|---------------------------------------------------------------------------|---------------------|
| ▪ Grad REACH Scholar | Aug 2024 – Current |
| ▪ Pathbreakers Fellow (formerly University Center of Exemplary Mentoring) | Aug 2023 – Current |
| ▪ National Defense Science and Engineering Graduate (NDSEG) Fellow | Aug 2022 – Aug 2025 |
| ▪ Florida Academic Scholars Award | Aug 2017 – May 2021 |
| ▪ SwampHacks VI Infinite Energy's Best Hack Award | Jan 2020 |

Extracurriculars

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|---------------------------------------------------|----------------------|
| ▪ PADI Advanced Open Water Diver | July 2023 – Current |
| ▪ Student Pilot @ Skybound Aviation (90+ hours) | July 2023 – Current |
| ▪ Georgia Tech Marching Band/Drumline: Snare Drum | July 2023 – May 2024 |

Skills

- *Design & Manufacturing:* SolidWorks (CAD, FEA), Fusion 360 (CAD/CAM), Machine Shop Equipment (Lathes, Mills, CNC, Welding), Rapid Prototyping
- *Programming:* Python (NumPy, Pandas, OpenCV, PyTorch, TensorFlow, ROS, OpenMDAO), C/C++, JavaScript, MATLAB, Simulink, VBA, VHDL
- *Certifications:* Amateur Radio Technician (2019, KN4ZUC), SOLIDWORKS Associate (2020), Student Pilot (90+ hours), PADI Open Water Diver
- *Languages:* English and Spanish



Community Involvement

▪ 2025 Georgia Tech Robotics Summer Scholars (GTRSS) Summer Camp Organizer	Jan 2025 – Jul 2025
▪ 2025 IEEE International Conference on Robotics and Automation Volunteer	May 2025
▪ 2024 Georgia Tech Robotics Summer Scholars (GTRSS) Summer Camp Organizer	Jan 2024 – Jul 2024
▪ 2023 Georgia Tech Robotics Summer Scholars (GTRSS) Summer Camp Organizer	Jan 2023 – Jul 2023
▪ Elementary School Science Fair Judge	Nov 2022, Nov 2023
▪ Atlanta Science Festival Volunteer	Mar 2023
▪ American Controls Conference Volunteer	Jun 2022
▪ National Biomechanics Day Organizer	Feb 2022 - Apr 2022