Carlos A. Carrasquillo Torres

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Education

Georgia Institute of Technology | GPA: 3.9 / 4.0 — **Aug 2021 – Present**

- PhD, *Robotics* — Expected Spring 2026
- Master of Science, *Computer Science*, Machine Learning Specialization — May 2025
- Master of Science, *Aerospace Engineering* — May 2025

University of Florida | GPA: 3.7 / 4.0 — **Aug 2017 – May 2021**

- Bachelor of Science, *Mechanical Engineering*, Magna Cum Laude Honors — May 2021
- Bachelor of Science, *Computer Engineering*, Magna Cum Laude Honors — May 2021

Research Experience

Graduate Research Assistant | Georgia Institute of Technology, Institute for Robotics and Intelligent Machines — **Aug 2021 – Current**

Location: Atlanta, GA
Lab: DART Lab and EPIC Lab
Advisors: Anirban Mazumdar, PhD, Aaron Young, PhD

- Developed and validated novel exoskeleton controllers, including impedance-based, primitive-based, uncertainty-aware, and end-to-end biological torque controllers.
- Designed mechatronics components, including PCBs, sensor drivers, and orthoses components for several exoskeletons.
- Applied deep learning techniques (TCNs, VAEs, CNNs, GANs, Transformers, PPO) to estimate human motion, biological moments, and other physiological states.
- Built real-time exoskeleton software, including multiprocessing controller frameworks, communication packages, and GUIs.
- Created VR/AR games in Unity to provide real-time biofeedback and simulate unstructured environments for human studies.
- Conducted human-subject experiments using Delsys EMG, Vicon motion capture, Parvo and COSMED metabolic systems, HTC Vive Pro and Meta Quest 3S headsets.

Undergraduate Research Assistant | University of Florida, Dept of Mechanical and Aerospace Engineering — **Jan 2019 – Aug 2021**

Location: Gainesville, FL
Lab: ADAMUS Lab
Advisors: Riccardo Bevilacqua, PhD

- 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].
- Developed a Python-based ground station application to manage satellite mission operations, enabling reliable telecommand transmission and downlink data acquisition.

Industry Experience

Software & Mechanical Engineering Intern — **May 2021 – April 2023**

Location: Dallas, TX
Company: RTX
Advisors: Chris Bender, Malia Kawamura

- Engineered a MERN stack web application that streamlined component discovery on printed circuit boards for engineers.
- Designed and deployed five process programs and Splunk dashboards to monitor and optimize production-grade machinery.
- Automated a manual material testing process by building a VBA-based desktop application, improving data logging and tracking efficiency.

Teaching Experience

Teaching Assistant —Vertically Integrated Projects (VIP) | Georgia Institute of Technology **Aug 2021 – Current**

Semesters: Fall 2021 — Current
Course Instructors: Anirban Mazumdar, PhD; 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 | University of Florida **May 2019 – May 2021**

Semesters: Summer 2019, Fall 2019, Spring 2020, Summer 2020, Fall 2020, Spring 2021
Course Instructor: 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 | University of Florida **Aug 2020 – Dec 2020**

Semesters: Fall 2020
Course Instructors: 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 | University of Florida **Aug 2020 – Dec 2020**

Semesters: Fall 2020
Course Instructor: 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 | University of Florida **May 2019 – Aug 2020**

Semesters: Summer 2019, Summer 2020
Course Instructors: 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.

Publications

[J9] **C. Carrasquillo**, A. Mazumdar, A. Young. "Metabolically Optimal Control of a Hip-Knee Exoskeleton Using Primitive-Based Optimization". (In Prep)

[J8] **C. Carrasquillo**, S. Leapley, R. Casey, C. Nuesslein, G. Sawicki, A. Mazumdar, A. Young. "Biomechanical Analysis of a Hip-Knee Exoskeleton for Manual Labor Tasks". (In Prep)

[J7] **C. Carrasquillo**, D. Chen, M. Gideon, A. Mazumdar. "Metabolically Optimal Route Planning for Human Navigation". (In Prep)

[J6] **C. Carrasquillo**, A. Mazumdar, A. Young. "Uncertainty-Aware Physiological State Estimation for Wearable Robotics". (In Prep)

[J5] **C. Carrasquillo**, B. Hanna, A. Mazumdar, A. Young. "Intuitive Steering Assistance from a Wearable Robotic Assistive System for Visually Impaired Navigation". (In Prep)

[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. (Accepted)

[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.

Presentations

[P6] **C. Carrasquillo**, A. Bajpai, A. Mazumdar, L. Ting, A. Young. "Unsupervised Discovery of Human Motion Primitives from Biomechanical Data". American Society of Biomechanics. August 2025.

[P5] **C. Carrasquillo,** A. Bajpai, D. Iyengar, K. Collins, A. Mazumdar, A. Young. "Enhancing Human Navigation Ability Using an Active Wearable Exoskeleton". IEEE World Haptics. July 2025.

[P4] 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.

[P3] **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.

[P2] **C. Carrasquillo**, "Towards Functional Exoskeleton Control". The National Defense Science and Engineering Graduate Fellowship Conference. July 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.

Fellowships and Awards

- 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

- PADI Advanced Open Water Diver **July 2023 – Current**
- Private Pilot (90+ hours) **July 2023 – Current**
- Georgia Tech Marching Band/Drumline: Snare Drum **July 2023 – May 2024**

Skills

- **Design & Manufacturing:** Altium Designer (PCB), SolidWorks (CAD, FEA), Fusion 360 (CAD/CAM), Machine Shop Equipment (Lathes, Mills, CNC, Welding), Rapid Prototyping
- **Programming:** Python (NumPy, Pandas, OpenCV, PyTorch, TensorFlow, ROS/ROS2, OpenMDAO), C/C++, C# (Unity), JavaScript (React.js, MongoDB, Express.js, Node.js), MATLAB, Simulink, VBA, VHDL
- **Experimentation:** AR/VR, Electromyography, Metabolics (COSMED, Parvo), Motion Capture (Vicon), OpenSim
- **Miscellaneous Projects:** reinforcement learning-based aircraft landing autopilot, microprocessor knee recommendation algorithm, bioreactor pump controller, 12-degree-of-freedom quadruped robot, 3D bioprinter, desktop lathe, MIPS CPU, assortment of websites
- **Certifications:** Amateur Radio Technician (2019, KN4ZUC), SolidWorks Associate (2020), Private Pilot (90+ hours), Advanced Open Water Diver
- **Languages:** English and Spanish

Community Involvement

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