Jairo Maldonado-Contreras

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EDUCATION

Ph.D. in Robotics | Georgia Institute of Technology *Expected Dec 2024*
- Concentration: Mechanics, Perception & Artificial Intelligence
- Recipient of the NSF ARMS, GEM, Goizueta, and Ford Foundation Graduate Fellowships (Total: $170K)

B.S. in Mechanical Engineering | California State University Long Beach *May 2019*
- Recipient of the CSULB College of Engineering's 2019 Outstanding Graduate Award (1/1,000) (article link)

EXPERIENCE

Georgia Institute of Technology, *Robotics PhD Candidate* | Atlanta, GA *Aug 2019 – Present*
- Led a team of 13 members, overseeing multiple machine learning research projects involving a $20,000 robotic leg prosthesis
- Implemented communication protocols, including UART, I2C, and TCP/IP, to enable real-time sensor data acquisition
- Integrated C++ and Python-based control systems on an NVIDIA Jetson Nano for real-time, asynchronous, multi-DOF control
- Achieved state-of-the-art performance in real-time human intent recognition with a 5.20% difference from offline implementation
- Reduced model error by 30% through real-time continual learning, enhancing walking speed adaptablity for new prosthetic users
- Realized a 46% reduction in model error via domain adaptation and transfer learning, enabling efficient training with minimal data
- Auto-tuned prosthesis control parameters using Bayesian optimization, reducing tuning time by over 30 minutes per patient

LegBots, LLC, *Software Consultant* | Remote *Nov 2023 – May 2024*
- Advised a two-person team of software developers in the development of control algorithms for a bi-pedal exoskeleton
- Coordinated with international manufacturing companies to meet hardware and sensor specifications

MIT Lincoln Laboratory, *Research Intern* | Lexington, MA *Jun 2019 – Aug 2019*
- Implemented lidar-based 3D mapping algorithms (e.g., SLAM) on a semi-autonomous UGV for low-light environments
- Designed parts for the NASA TBIRD CubeSat to enable laser communication from low earth orbit

NASA Jet Propulsion Laboratory, *Robotics Intern* | Pasadena, CA *Aug 2018 – May 2019*
- Created a 1-DOF gimbal with a closed-loop control system for attitude control of a camera during cave exploration
- Manufactured a node-dropping mechanism that enabled communication between UAVs and UGVs within caves

Massachusetts Institute of Technology, *Research Intern* | Cambridge, MA *Jun 2018 – Aug 2018*
- Designed and manufactured a pair of 2-DOF robotic arms to support 25% of a human's weight
- Implemented closed-loop velocity control of the robotics arms

Rehabilitation Institute of Chicago, *Research Intern* | Chicago, IL *Jun 2017 – Aug 2017*
- Implemented K-means clustering algorithms to classify GPS data of post-stroke individuals and improve patient outcomes
- Assessed physical evaluations on post-stroke participants, while maximizing patient comfort and safety

California State University Long Beach, *Research Fellow* | Long Beach, CA *Aug 2015 – May 2019*
- Designed a vibrotactile device for prosthesis users that improved response time to external perturbations by 17%
- Engineered real-time gait phase detection algorithms using a single 6-axis IMU

PROJECTS

Intact Joint Power Estimation using Prosthesis-side Sensors *May 2024*
- Trained deep learning regression models to estimate intact-side joint power using distal sensor data from a robotic leg prosthesis

LLMs for Prosthesis Preference Tuning *Dec 2023*
- Fine-tuned a Hugging Face LLM for user-driven prosthetic adjustments, using OpenAI Whisper for translation

3D Point Cloud Radar for Terrain Estimation in Prosthetic Control *Dec 2023*
- Generated 3D point clouds from 2D radar data to estimate terrain incline and adjust prosthetic assistance

RGB-D Image Segmentation for Prosthetic Device Assistance *May 2023*
- Applied deep learning segmentation to extract limb segments from images, calculating gait symmetry metrics for prosthetic control

Multi-modal Sensing and Navigation on TurtleBot 3 *May 2019*
- Developed TurtleBot navigation through a maze using sign image classification and LiDAR-based obstacle avoidance

SKILLS

Relevant Coursework: Artificial Intelligence, Computer Vision, Deep Learning, Machine Learning, Mechatronics
Programming/Software: C++, CSS, GitHub, HTML, Linux, MATLAB, OpenCV, Python, PyTorch, ROS, TensorFlow, Vicon
Languages: English (native) and Spanish (fluent)

Visit my personal webpage for a full list of my publications: *jairoymc.com*