

Juan-Diego Florez

US Citizen

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Education

Doctor of Philosophy (PhD) in Robotics, Minor in Math Methods for Autonomy

Aug. 2020 - May 2025

Georgia Institute of Technology, Atlanta, GA – Advisor: Dr. Panagiotis Tsiotras

Master of Science (MS) in Robotics Engineering

Aug. 2018 - May 2020

Worcester Polytechnic Institute, Worcester, MA – Advisor: Dr. Marko Popovic

Bachelor of Science (BS) in Mechanical Engineering, Magna Cum Laude

Aug. 2014 - May 2018

Florida Institute of Technology, Melbourne, FL – Advisor: Dr. Beshoy Morkos

Relevant Experience

Graduate Research Assistant - Multi-Agent Satellite Inspection

Jan. 2023 - Present

Georgia Institute of Technology, Dynamics and Control Systems Lab, Atlanta, GA

- Developing, in a team of three, SatSLAM, a monocular visual Simultaneous Localization and Mapping (vSLAM) pipeline for orbital relative navigation which uses factor graph estimation and Gaussian Splatting reconstruction [C++, Python, OpenCV, GTSAM, Machine Learning]
- Extending SatSLAM to multi-agent operation, ensuring distributed estimation, lean information sharing, and real-time performance [ROS2]
- Contributing to the creation of a photorealistic image-generation pipeline and creating a dataset of realistic satellite inspection trajectories, defining a new standard for training vision models for satellite inspection [Python, Unreal Engine 5, Blender, OpenGL]

Intern - Autonomous Space Systems

May 2022 - Aug. 2022

Verus Research, AFRL Local Intelligent Networked Collaborative Satellites Lab, Albuquerque, NM

- Designed the system identification and control procedure for quadcopter steering [Python]
- Created the information-sharing scheme between autonomous agents and ground control [ROS2]

Graduate Research Assistant - Human-Robot Artistic Collaboration

Jan. 2021 - Dec. 2022

Georgia Institute of Technology, Borg Lab, Atlanta, GA

- Applied human trajectory modeling to robot motion tasks using factor graph optimization [GTSAM, Python, C++]
- Implemented impedance controller for haptic teleoperation of the Franka Emika Panda manipulator [ROS, C++]
- Contributed to the design and evaluation of a cable-driven parallel robot used to emulate human motions

Researcher - General Analytical Inverse Kinematics (IK) Solver

Jan. 2019 - Jan 2022

Independent Research, Remote

- Developed, in a team of two, a novel analytical IK solver for 7-DOF robotic manipulators with joint offsets [MATLAB, C++]
- Implemented solver on the Franka Emika Panda arm, generating up to 16 solution configurations

Student Researcher - Vertical Entry Robot for Navigating Europa

Aug. 2020 - Dec. 2020

Georgia Institute of Technology, Space Systems Design Laboratory, Atlanta, GA

- Worked in a team to develop the designs of both the excavation drill and ice anchoring system for an autonomous probe [SolidWorks]

Graduate Research Assistant - Biomimetic Actuation and Control

Aug. 2018 - Aug. 2020

Worcester Polytechnic Institute, Popovic Lab, Worcester, MA

- Developed a parameter selection procedure for designing BENE modules—scalable, nonlinear elastic elements [MATLAB, SolidWorks]
- Designed, in a team of two, a variable-stiffness actuated robotic limb for a quadruped and validated the BENE modules on it [SolidWorks]
- Aided in the design of a linear and angular momentum control scheme for a quadruped in microgravity [ROS, Python]
- Mentored a team of two to design a flow-control valve for synthetic muscle actuation in humanoid walking robots [MATLAB, SolidWorks]

Undergraduate Capstone Team Lead - Mars Multi-Rover System

Sep. 2017 - July 2018

Florida Institute of Technology, sponsored by NASA Jet Propulsion Laboratory, Melbourne, FL

- Led a multi-disciplinary team of 22 students to develop and manufacture two unique rovers, equipped with a 5-DOF manipulator useable for sample extraction, repair, or collaborative tasks [SolidWorks, ANSYS Workbench, SysML]
- Implemented robot vision and manipulator pose control for human-in-the-loop manipulation and collaboration tasks [C++]

Relevant Publications

1. **J.-D. Florez**, I. Velentzas, M. Dor, and P. Tsiotras, "SatSLAM: Autonomous Monocular Navigation For Satellite Inspection Missions," 2024, arXiv. (Preparing Submission to IEEE TF-R)
2. **J.-D. Florez**, M. Dor, and P. Tsiotras, "Initialization of Monocular Visual Navigation for Autonomous Agents Using Modified Structure from Small Motion," 2024, arXiv. (Submitted to ACC25)
3. G. Chen, S. Bayek, **J.-D. Florez**, W. Qian, L. Sang-Won, S. Hutchinson, and F. Dellaert, "GTGraffiti: Spray Painting Graffiti Art from Human Painting Motions with a Cable Driven Parallel Robot," 2022 International Conference on Robotics and Automation (ICRA), Philadelphia, PA, USA, 2022, pp. 4065-4072.
4. J. D'Agostino, E. Clarrissimeaux, S. Moffat, **J. D. Florez-Castillo**, F. Sanchez, M. Bowers, and M. B. Popovic, "Novel Compact Robotic Flow Control Valve for Bioinspired Exosuit and Other Applications," in Biomedical Engineering Systems and Technologies: 13th International Joint Conference, BIOSTEC 2020, Valletta, Malta, February 24–26, 2020, Revised Selected Papers 13, 2021, pp. 17–38.
5. **J.-D. Florez-Castillo**, "Novel Bidirectional Elastic Nonlinear Element (BENE) for Robotic Antagonistic Actuation," M.S. Thesis, WORCESTER POLYTECHNIC INSTITUTE, 2020.