BERNARDO ROCAMORA

Robotics Research Engineer · Motion Planning & Manipulation · Autonomous Systems

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SUMMARY

Robotics engineer with a PhD in Aerospace Engineering and 5+ years of experience building autonomous systems that work in the real world. Expertise in motion planning, robot manipulation, and end-to-end autonomy development — from algorithm design and simulation to hardware integration and field deployment. At L5 Automation, have been serving as key technical staff for a dual-arm strawberry harvesting robot, achieving a field-proven proof of concept and conceiving a crop phenotyping service (TraitScout™).

TECHNICAL SKILLS

Languages: C++, Python, MATLAB, CUDA

Robotics & Simulation: ROS/ROS2, Gazebo, MuJoCo, OMPL, MoveIt, PX4, LeRobot

ML & Perception: PyTorch, TensorFlow, Keras, scikit-learn, OpenCV, PCL

Tools & Infrastructure: Git, Docker, Linux, MS Office, Claude Code

Design: CAD (SolidWorks, Fusion 360, Onshape), 3D printing, rapid prototyping, PCB design, Arduino.

Hardware Experience: LiDAR, GNSS receivers, Cameras, UR3 and FANUC LRMate robot arms, DJI/Holybro quadcopters

PROFESSIONAL EXPERIENCE

Robotics Research Engineer — Motion Planning & Manipulation Lead

L5 Automation Inc. · January 2024 – Present · Seattle, WA

- Designed and assembled a **1,500+ lb dual-arm strawberry harvesting robot prototype** (Frazor 2) with a 7th-axis linear rail system, achieving harvesting under dense foliage — a proof of concept no competitor had demonstrated. Built a behavior tree-based task-switching architecture for **coordinated dual-arm manipulation** in shared workspace, integrating foliage manipulation and berry detection pipelines. Developed a complete **Gazebo simulation environment** with synthetically generated, randomized strawberry farm worlds, significantly accelerating development cycles and enabling safe testing.
- R&D for NSF, USDA, and NASA SBIR research grants. Including implementation of **viewpoint planning and 3D occupancy mapping** techniques with TSP-based **route optimization** (OR-Tools) for complete coverage of strawberry beds. Implementation of position-based dynamics for deformable object simulation and evolutionary optimization of stem/cable manipulation strategies, and development of a **multi-sensor localization pipeline** combining visual odometry, IMU, and GNSS via extended Kalman filter for robust outdoor state estimation.
- Conceptualization and implementation of **TraitScout™**, a crop phenotyping service that autonomously counts flowers and strawberries across ripeness stages in outdoor field conditions. Development of data collection and automated data processing pipelines. Development of **multi-object tracking** using a multi-view multi-camera system. First commercial pilot underway at UC Davis.
- Conduced field testing, troubleshooting, and public demonstrations for 600+ attendees at Cal Poly Strawberry Field Day and UC Hansen VINE Connect Day.
- Co-wrote and served as key technical staff on multiple successful **NSF, USDA, and NASA SBIR grant proposals**, contributing to over $775k in non-dilutive funding for the team.

Graduate Research Assistant — Statler PhD Fellow

West Virginia University, Field and Aerial Robotics Lab · January 2020 – December 2023 · Morgantown, WV

- Developed **sensor-space lattice-based motion planning** algorithms for autonomous drone flight under tree canopies without prior map knowledge, achieving planning times under 30ms (under 5ms with CUDA parallelization). Research grant funded by Amazon Research Awards. Published at **2021 ICRA.**
- Designed and built **Oxpecker**, a PX4-based tethered UAV as part of a cooperative UGV/UAV system for autonomous 3D inspection of underground stone mine pillars. Implemented a finite state machine for mission planning integration. Research grant funded by Alpha Foundation. Published in Drones 2023.
- Developed a sampling-based energy- and wind-aware motion planner for conceptual airships to be deployed in Venus' atmosphere. Research grant funded by NASA EPSCoR program.Published in Autonomous Robots in 2023.

- Served as Autonomy & Manipulation Lead and Systems Integration Co-Lead for Team Mountaineers in the NASA Space Robotics Challenge Phase 2 (multi-robot coordination for Lunar ISRU). Achieved 6th place out of 114 teams (1st among US universities), **winning a total prize of $45,000**. Published at Frontiers of Robotics and AI in 2023.
- Recipient of the **Statler PhD Fellowship** ($27,500/year, 3 years).
- Co-mentored master's and undergraduate students; IEEE reviewer for RA-L, ICRA, IROS, and Journal of Navigation.

Independent Consultant — Sensor Fusion Engineer Nanodegree (SFND) Mentor

Udacity · June – December 2019 · Remote / São Paulo, Brazil

- Mentored students in C++ projects for sensor fusion (camera, LiDAR, radar) applied to self-driving cars.

Design & Development Engineer

Birdview DroneScan · July 2018 – July 2019 · Botucatu, Brazil

- Designed, prototyped, and assembled embedded UAV dispenser systems for biological pest-control agents.
- Developed a computer vision-aided system for automated tree-counting service based in aerial imagery using Python/OpenCV.

EDUCATION

Ph.D. Aerospace Engineering · West Virginia University, Morgantown, WV · 2020–2023 · GPA 4.0/4.0

Dissertation: Motion Planning for Autonomous Navigation in Cluttered Environments · Advisor: Dr. Guilherme A.S. Pereira

M.Sc. Mechanical Engineering · University of São Paulo, São Carlos, Brazil · 2016–2019

B.Sc. Aeronautical Engineering · University of São Paulo, São Carlos, Brazil · 2010–2015

Non-Degree International Student · University of Southampton, Southampton, UK · 2013–2014

- Recipient of the “Brazil Scientific Mobility Program” scholarship from National Council for Scientific and Technological Development (CNPq, Brazil) for a year of study in the UK.

SELECTED PUBLICATIONS AND PATENTS

- **Rocamora Jr. BM**, Pereira GAS. *"Optimal policies for autonomous navigation in strong currents using fast marching trees."* Autonomous Robots 48 (27), 1-19 (2024).
- **Rocamora Jr. BM**, Simplicio PVG, Pereira GAS. *"A Behavior Tree Approach for Battery-Aware Inspection of Large Structures Using Drones."* 2024 Int. Conference on Unmanned Aircraft Systems (ICUAS), 234-240 (2024).
- Gutierrez, A, Schneider, D, Terry, E, **Rocamora Jr, BM**, L5 Automation Inc. *“Dynamic coordination of multiple robotic manipulator arms.”* U.S. Patent Application 18/679,288 (2024).
- **Rocamora Jr. BM**, Lima RR, Samarakoon K, Rathjen J, Gross JN, Pereira GAS. *"Oxpecker: A Tethered UAV for Inspection of Stone-Mine Pillars."* Drones 7(2), 73 (2023).
- **Rocamora Jr. BM**, Kilic C, Tatsch C, Pereira GAS, Gross JN. *"Multi-Robot Cooperation for Lunar In-Situ Resource Utilization.”* Frontiers in Robotics and AI 10, 38 (2023).
- **Rocamora Jr. BM**, Pereira GAS. *"Fast Path Computation Using Lattices in the Sensor-Space for Forest Navigation."* 2021 IEEE Int. Conference on Robotics and Automation (ICRA), 1117-1123 (2021).

CERTIFICATIONS & CONTINUED LEARNING

Deep Learning Specialization · Coursera / DeepLearning.AI · 2022 · 17 weeks (CNNs, RNNs, RL)

Flying Car & Autonomous Flight Engineer Nanodegree · Udacity · 2018

Robotics Specialization · Coursera / University of Pennsylvania · 2017 · 26 weeks

LANGUAGES

English — Fluent · Portuguese — Native · Spanish — Native · French — Basic