Ivana Collado Gonzalez

Ph.D. Candidate in Mechanical Engineering - Robotics | Stevens Institute of Technology | Hoboken, NJ, USA

icollado@stevens.edu | https://ivanacollg.github.io | linkedin.com/in/ivana-collado | github.com/ivanacollg

About Me

PhD candidate specializing in marine robotics, perception, and autonomy. Experienced in multi-sensor fusion, planning under uncertainty, and experimental validation in challenging marine environments. My research focuses on robot perception, navigation, and decision-making for autonomous systems operating in complex underwater settings. By developing algorithms that perform reliably in real-world conditions, I aim to enable fully autonomous systems for underwater infrastructure maintenance and environmental monitoring. I am passionate about advancing technologies that promote sustainability and strengthen ecological integrity.

Research Interests: Marine robotics, perception, mapping, SLAM, exploration, planning under uncertainty, decision-making, and multi-sensor fusion.

Education

Doctor of Philosophy in Mechanical Engineering - Robotics
Stevens Institute of Technology, USA Sept 2021 – Present

Master of Engineering in Robotics
Stevens Institute of Technology, USA Sept 2021 – May 2023

Bachelor of Science in Mechatronics Engineering
Tecnologico de Monterrey (ITESM), Mexico Jan 2016 – Dec 2020

Research Experience

Graduate Research Assistant, Robust Field Autonomy Lab
Stevens Institute of Technology, USA Sept 2021 – Present

Improving situational awareness for robots navigating in degraded sensing underwater environments, supervised by Dr. Brendan Englot.

Opti-Acoustic Sensor Fusion for AUVs working in Turbid Underwater Environments

- Developed sonar and monocular vision fusion algorithm for AUV perception and reconstruction in turbid waters.
- Developed stereo sonar and monocular vision fusion and 3D mapping algorithm for AUVs in turbid waters.
- Designed and conducted experiments to test robotic systems in tank, and marina field trials.

Autonomous Underwater Vehicle Planning Under Uncertainty

- Designed a computationally efficient planning under uncertainty framework suitable for AUV navigating in large-scale, feature-sparse environments.
- Designed and conducted experiments in realistic Gazebo simulation using UUV Simulator.

AUV Perception and Planning for Aquaculture Inspection Tasks

- Underwater net detection strategy using Yolov11.
- Designed a path planning and following strategy for aquaculture net cleaning using ROS2.
- Project in conjunction with Dr. Tomonari Furukawa from University of Virginia and Dr. Long Wang from Stevens Institute of Technology.

Unmanned Surface Vehicle Navigation and Control in Simulation

- Tunning of USV path following control using ROS2 navigation stack and VRX simulation in Gazebo.

Independent Undergraduate Research Projects
Tecnologico de Monterrey (ITESM), Mexico Jan 2020 – Dec 2020

Applying Model Predictive Control (MPC) for obstacle collision avoidance for autonomous surface vehicles, supervised by Dr. Carlos Sotelo and Dr. David Sotelo.

Developed a static obstacle collision avoidance algorithm for autonomous surface vehicles using Deep Reinforcement Learning (DRL), supervised by Dr. Leonardo Garrido.

Robotics Institute Research Scholar, Navigation Lab
Carnegie Mellon University (CMU), USA Jun 2019 – Aug 2019

Developed LiDAR-based perception for autonomous cars, supervised by Dr. Luis Ernesto Navarro-Serment.

- Proposed a machine learning methodology for static pedestrian detection from vertically sparse 3D point clouds.

Research Internship in Mechatronic Systems
L'École Polytechnique de Montréal, Canada May 2018 – Aug 2018

Worked on algorithms for eye tracking and face gesture identification using stereo cameras, supervised by Dr. Sofiane Achiche.

Industry Experience

Robotics and Artificial Intelligence Engineer
XLab - Protexa R&D, Mexico Dec 2020 – Jul 2021

- Developed a ROS-based Guidance, Navigation, and Control (GNC) system for a mobile robot.
- Implemented a PID low level speed and heading control, along with a pure pursuit lateral control.
- Integrated a path planning and guidance strategy for global and reactive behaviors.
- Developed a gazebo simulation for a mobile robot platform.

Robotics R&D Intern
XLab - Protexa R&D, Mexico Jan 2020 – Dec 2020

- Integrated and developed computer vision and machine learning solutions for mobile robot perception.
- Supported unit testing while supervising code standards and documentation.

Publications

1. J. McConnell, I. Collado-Gonzalez, P Szenher, A, Shariati. **"Maritime scene matching for inter-robot localization across surface and underwater domains"**, *Robotics and Autonomous Systems*, 2025.
2. I. Collado-Gonzalez, J. McConnell, P. Szenher, and B. Englot. **"Opti-Acoustic Scene Reconstruction in Highly Turbid Underwater Environments."** *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, accepted, to appear, 2025.
3. I. Collado-Gonzalez, J. McConnell, P. Szenher, and B. Englot. **"Real-Time Planning Under Uncertainty for AUVs Using Virtual Maps."** *IEEE International Conference on Robotics and Automation (ICRA)*, 2024.
4. J. McConnell, I. Collado-Gonzalez, P. Szenher, B. Englot. **"Large-Scale Dense 3-D Mapping Using Submaps Derived From Orthogonal Imaging Sonars"**, *IEEE Journal of Oceanic Engineering*, 2024.
5. I. Collado-Gonzalez, A. Gonzalez-Garcia, R, Cuan-Urquizo, C. Sotelo, D Sotelo, H. Castañeda. **"Adaptive sliding mode control with nonlinear MPC-based obstacle avoidance using LiDAR for an autonomous surface vehicle under disturbances"**, *Ocean Engineering*, 2024.
6. A. Gonzalez-Garcia, I. Collado-Gonzalez, R. Cuan-Urquizo, C. Sotelo, D. Sotelo, H. Castañeda. **"Path-following and LiDAR-based obstacle avoidance via NMPC for an autonomous surface vehicle"**, *Ocean Engineering*, 2022.
7. J. McConnell, I. Collado-Gonzalez, B. Englot, **"Perception for Underwater Robots"**, *Current Robotics Reports*, 2022.
8. J. McConnell, Y. Huang, P. Szenher, I. Collado-Gonzalez, B. Englot. **"DRACo-SLAM: Distributed robust acoustic communication-efficient SLAM for imaging sonar equipped underwater robot teams"**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022.
9. A. Gonzalez-Garcia, D. Barragan-Alcantar, I. Collado-Gonzalez, L. Garrido. **"Adaptive dynamic programming and deep reinforcement learning for the control of an unmanned surface vehicle: Experimental results"**, *Control Engineering Practice*, 2021.
10. I. Collado-Gonzalez, A. Gonzalez-Garcia, C. Sotelo, D. Sotelo, H. Castañeda. **"A real-time NMPC guidance law and robust control for an autonomous surface vehicle"**, *IFAC-PapersOnLine*, 2021.

11. A. Gonzalez-Garcia, D. Barragan-Alcantar, I. Collado-Gonzalez, L. Garrido. **"Control of an Unmanned Surface Vehicle Based on Adaptive Dynamic Programming and Deep Reinforcement Learning"**, *International Conference on Deep Learning Technologies*, 2020.
12. A. Gonzalez-Garcia, D, I. Collado-Gonzalez, R. Cuan-Urquizo, R. Reyes, L. Garrido. **"A 3D Vision Based Obstacle Avoidance Methodology for Unmanned Surface Vehicles"**, *Mexican Robotics Congress*, 2019.
13. I. Collado-Gonzalez, L. Navarro-Serment. **"Detection of Static Pedestrians from Vertically Sparse 3D Point Clouds"**, *Robotics Institute Summer Scholar Working Papers Journal*, 2019.

Awards and Honors

- Fulbright-García Robles Scholarship for Graduate Studies in the United States, COMEXUS, 2021-2024
- American Bureau of Shipping Scholarship, ABS, 2022-2023
- First Year PhD Student Provost Fellowship, Stevens institute of Technology, 2021-2022
- 1st Place, RoboBoat and 3rd Place RoboSub competition, RoboNation, 2020

Reviewer

- IEEE Transactions on Robotics (T-RO).
- IEEE Robotics and Automation Letters (RA-L)
- IEEE International Conference on Robotics and Automation (ICRA).
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

Teaching and Mentoring

Robust Field Autonomy Lab Mentor
Stevens Institute of Technology, United States May 2022 – Aug 2025
I have mentored the following undergraduate and master's students with my doctoral advisor, Prof. Brendan Englot:

- Michael Cougle. "ROS2 Autonomous Underwater Vehicle Path Following Simulation", Undergraduate Research Scholar, May 2025 - Aug 2025.
- Daniel Roche. "Mechanical and Electrical design and integration of an Underwater Robot", Undergraduate Research Scholar, May 2024 - Aug 2024.
- Luisa Bonfim. "Monocular and Stereo Camera Benchmark Comparison for Underwater Localization and Reconstruction", Graduate Research Assistant , Jan 2024 - May 2024.
- J Lovelace. "Depth Recovery from Stereo Cameras on Remotely Operated Vehicles", Undergraduate Research Scholar, May 2023 - Aug 2023, and May 2024 - Aug 2024.
- Kristen Williams, "Optical Flow for Fence Detection and Tracking in Sonar Images", Undergraduate Research Scholar, May 2022 - Aug 2022.

Undergraduate Physics Laboratory Instructor
Tecnologico de Monterrey (ITESM), Mexico Aug 2018 – Dec 2018

Skill Set

Programming Languages: C++, Python, MATLAB, and ROS.

Software and Tools: Linux, Git, OpenCV, PCL, Scikit-Learn, PyTorch, TensorFlow, Gazebo, and CAD (SolidWorks).

Technical Skills: Machine Learning, Computer Vision, Robot Kinematics, Path Planning, SLAM, Control Systems, and Hardware Integration.

Languages

Spanish: Native **English:** Advanced - C1 **German:** Beginner - A2