Álvaro Quintana

Robotics and Autonomous Systems Engineer | ROS 2 | C++

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Profile

Robotics and Autonomous Systems Engineer with hands-on experience developing and integrating real robotic systems using ROS 2. Strong background in autonomous navigation, perception, and simulation, with the ability to design, implement, and debug complete robotic solutions from low-level control to system-level integration. Comfortable working across software and hardware in Linux-based environments.

Education

B.Sc. Robotics Software Engineering
Universidad Rey Juan Carlos (URJC) 2022–2026

Portfolio

Full project documentation and demonstration videos: aquintan4.github.io

The projects below represent a selected subset. Additional systems are documented online.

Selected Projects

Distributed Multi-Robot HRI and Navigation

Designed and deployed a multi-robot reception and guidance system on real Kobuki platforms using ROS 2, Behavior Trees, and Nav2. Focused on the integration of human–robot interaction and distributed autonomy.

- QR-based identification and dialogue integration
- Inter-robot coordination and supervision logic

Visual Odometry and Indoor Drone Navigation

Developed a monocular visual odometry pipeline based on optical flow, essential matrix estimation, and SE(3) pose composition. Integrated perception, localization, and semantic reasoning for indoor navigation.

- ROS 2 TF integration and pose publishing
- RANSAC-based outlier rejection

Autonomous Line-Following Robot (Real-Time Systems)

Implemented a real-time line-following robot combining control theory and embedded systems design. Structured around periodic FreeRTOS tasks and external monitoring.

- PD motor control and MQTT telemetry
- Obstacle-aware speed regulation

Monte Carlo Localization

Built a probabilistic localization system using particle filtering and custom LiDAR ray tracing. Emphasis was placed on computational efficiency and convergence stability.

- Multiprocessing-based sensor simulation

Technical Skills

Robotic System Integration (ROS 2)

Design and integration of distributed robotic systems using ROS 2, including node architectures, services and actions, TF management (TF2), lifecycle nodes, and behavior-based decision structures. Experienced in debugging and validating complex systems using RViz2 and rqt.

- Modular architectures and scalable autonomy

Autonomous Navigation

Experience with the Nav2 stack for autonomous navigation, as well as localization, mapping, and motion planning using SLAM Toolbox, AMCL, and OMPL. Focused on system robustness and parameter tuning.

- Costmaps, obstacle inflation, and planners

Simulation and Robot Modeling

Robot and environment modeling using URDF/Xacro and simulation tools. Solid experience with FreeCAD for mechanical design and hardware prototyping.

- Simulation-to-real workflows

Sensors and Perception

Experience working with LiDAR, RGB cameras, RGB-D cameras, and ultrasonic sensors, integrating their outputs into navigation and perception pipelines.

- Multi-sensor calibration and synchronization

Computer Vision (OpenCV)

Applied computer vision techniques using OpenCV, including camera calibration, feature-based methods, color-space analysis, and object detection. Experience integrating visual odometry and localization modules into robotic systems.

- SIFT, SURF, YOLO, Haar Cascades

Industrial Robotics and Control

Hands-on experience with ABB RobotStudio and RAPID programming. Strong foundations in analytical kinematics and Jacobian-based control.

- Denavit–Hartenberg modeling

Programming

Primary development in C++ for performance-critical systems and Python for rapid prototyping. Additional experience with C, MATLAB, Java, PDDL, and shell scripting.

Languages

Spanish (Native)
English (Professional)