Francesco Salvatore

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Experience

Robotics Engineer Tech United Eindhoven Sept. 2025 – Present
8x RoboCup World Champions *Eindhoven, NL*

- **Legacy System Migration:** Spearheading the architectural transition from legacy MATLAB/Simulink models to a high-performance **C++/ROS 2 Humble** stack for autonomous humanoid robots.
- **State Estimation Optimization:** Reverse-engineering and re-architecting a legacy **Sequential Clustering (SC)** ball-tracking algorithm for edge deployment, enabling real-time execution on robot hardware.
- **Probabilistic Modeling:** Implementing a robust **Bayesian Filtering** framework featuring recursive statistical updates and **MAP (Maximum A Posteriori)** estimation for optimal object localization.
- **Scalable Hypothesis Management:** Developed an unlimited hypothesis expansion and pruning algorithm to maintain tracking accuracy in high-noise environments while minimizing computational overhead.

Automation Engineer July 2025 – August 2025
Kellogg's *Mechelen, BE*

- **Distributed System Architecture:** Integrated three communication PLCs into a multi-controller diagnostic network to bypass primary controller memory saturation, maintaining a **zero-downtime requirement** for active production lines.
- **Real-Time Telemetry:** Developed and deployed a plant-wide **TCP Diagnostics Tool** for 36 Device Level Rings (DLR) circuits using custom Add-On Instructions (AOI) to monitor CIP timeouts, link status, and media errors.
- **Industrial Programming:** Refactored diagnostic logic using **Ladder Logic** and **Structured Text** to port legacy monitoring functions to Allen-Bradley ControlLogix and CompactLogix platforms.
- **Hardware Integration:** Aggregated telemetry from **Stratix managed switches** and mechatronic hardware into a unified monitoring ecosystem via FactoryTalk View SE to provide granular network health visibility.

Projects

Autonomous Construction Material Sorter | *MATLAB, Simulink, Stateflow, Raspberry Pi* Jan. 2026 – April 2026

- **Precision Control:** Designed a high-performance feedback controller for robot rotational axes, achieving **submillimeter placement accuracy** by conducting **FRF measurements**.
- **Computer Vision Robustness:** Optimized object detection in dynamic lighting by implementing **HSV/Lab color space masking** and tuning blob area thresholds to suppress sensor noise and environmental interference.
- **Real-Time State Logic:** Engineered a multi-stage **Stateflow** architecture to synchronize camera-based detection with quintic polynomial trajectory planning for jerk-limited, high-speed manipulation.
- **Hardware-in-the-Loop (HIL):** Developed and debugged the full control stack on **Raspberry Pi** hardware, integrating real-time MATLAB/Simulink functions with physical actuators and sensors.

Stair-Climbing Robot — *Siemens NX, Simcenter Motion, Arduino C++* Jan. 2025

- **Multibody Dynamics Strategy:** Engineered a high-torque locomotion system in **Siemens NX**, utilizing **Simcenter Motion** to simulate joint reaction forces and verify structural integrity during vertical step ascents.
- **Stability & CoM Control:** Performed dynamic **Center of Mass (CoM) plotting** to optimize component packaging, ensuring static stability and preventing tip-over during high-gradient obstacle navigation.
- **Embedded Control Systems:** Developed custom **Arduino C++** firmware to manage live joint-level control, implementing power-management logic for DC motors.
- **Prototyping & Validation:** Translated simulation results into a physical prototype, managing electrical wiring and sensor integration to maintain system reliability under high mechanical stress.

Education

Technological University Eindhoven Aug. 2024 – Present
Bachelor of Mechanical Engineering *Eindhoven, NL*

- **Relevant Coursework:** Dynamics and Control of Robotics Systems, Solid Mechanics, Thermodynamics.

Technical Skills

Design & Simulation: Siemens NX, SolidWorks, Onshape, Fusion 360, FEA, MarcMentat
Robotics & Controls: ROS2, Matlab/Simulink (Stateflow, Control System, Robotics System), PID
Embedded & Software: Python, C/C++, JavaScript, Git, Docker, Arduino, Raspberry Pi
Fabrication: Additive Manufacturing, CNC Routing, Laser Cutting, Electronic Prototyping