

# Nicolò Santilio

Automation & IoT Engineer | Full-Stack Developer | Edge-to-Cloud Systems, ROS2, Quarkus, Kubernetes

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## Professional Summary

Automation and IoT Engineer with full-stack background, experienced in designing edge-to-cloud architectures and digital twins for real-time control systems. Strong hands-on experience with ROS2, Quarkus, containerization and modern DevOps pipelines. Passionate about robotics, distributed software systems and secure IoT integration.

## Core Skills

**IoT & Automation:** ROS2, Gazebo, Digital Twin, MQTT, OPC-UA, Modbus/TCP, Edge Computing, RTOS, Arduino, Raspberry

**Languages:** Java, TypeScript/JavaScript, Golang, Lua, GDScript, Python, C++, SQL, NoSQL, HTML, GraphQL, Matlab

**Frameworks:** Quarkus, Spring Boot, Angular, Node.js, Vue.js, Vaadin, Express.js, Tailwind, Flask, Gin

**Integration Tools:** Camunda, Zeebe, WSO2, Kong Gateway, KrakenD, Tyk, Traefik, HA-Proxy, Nginx, Caddy

**Cloud, DevOps & CI/CD:** Git, Docker, Kubernetes, GitHub Actions, Vercel, Render, DigitalOcean, Observability

**Communication Patterns:** RESTful, gRPC, WebSocket, Server-Sent Events

**Databases:** PostgreSQL, MongoDB, MySQL, SQLite, Redis, Ethereum Blockchain, Elasticsearch, OpenSearch

**Platforms:** Firebase, Supabase, Appwrite

**Data & AI:** RLlib, Model Identification, Timeseries Analysis, LangChain, Ollama

**Security, Protocols & Standards:** OIDC-FED (OpenID Connect Federation 1.0), OpenID.Core, RFC7519 (JWT), RFC7523 (JWT OAuth Profile), RFC7636 (PKCE), RFC7638 (JWK Thumbprint), RFC7662 (OAuth Token Introspection), RFC9068 (JWT OAuth Access Token Profile), EN319-412-1 (Electronic Signatures), Real-time Streaming Protocol (RFC7826), MQTT (RFC9431), W3C WebAuthn, FIDO CTAP2

## Work Experience

### Solution Architect

Jan 2024 – Present

Auriga SpA, Bari (Italy)

- Orchestrated legacy and modern services using Quarkus and BPM tools – designed secure APIs and workflows across heterogeneous systems. *-84.4% execution time, -91.3% error rate.*
- Built a white-label SaaS platform for digital services – multi-tenant microservices, Kubernetes CI/CD. *faster time-to-market.*
- Delivered internal BPM/automation training – technical and managerial teams. *improved adoption and delivery speed.*

### Research & Development Engineer (NDA)

May 2022 – Jan 2023

W4 Games Limited, Remote

- Designed and implemented serverless backend services – Supabase, SQL. *optimized for real-time performance.*

### Software Engineer & Co-Architect (Apprenticeship)

Jan 2021 – Dec 2023

Auriga SpA, Bari (Italy)

- Developed e-commerce platform for digital services – Industry 4.0, microservice architecture. *improved*

*production process efficiency.*

- **Designed microservice stack and domain models** – SAGA, CQRS, API composition. *increased modularity and fault tolerance.*
- **Implemented blockchain-based contract certification** – Hyperledger Sawtooth. *secured transactions between suppliers and consumers.*

## Education

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**M.Sc. Automation Engineering | Cyber Physical Systems**  
Politecnico di Bari

*Sep 2021 – Jan 2026*

- **Coursework:** Optimization and Control, Advanced Software Engineering, Secure Programming Laboratory, Artificial Intelligence for Automation, Control of Network Systems, Data Model Identification and Intelligent Control, Final Examination, Internship Training and Guidance, Model Predictive Control, Robotics, Artificial Intelligence and Machine Learning, Big Data, Business Process Management, Distributed Measurement and Data Acquisition Systems, Dynamical Systems Theory, Embedded Control, Estimation and Control of Dynamical Systems, Internet of Things. ([Course information](#))

**First-Level Master | Digital and Sustainable Transformation of Processes**  
Politecnico di Bari

*Feb 2025 – Apr 2025*

- **Coursework:** Methods for Business Process Management, Sustainable Transformation of Business Processes, Digital Transformation of Business Processes, Project work and final exam. ([Course information](#))

**B.Sc. Computer and Automation Engineering**  
Politecnico di Bari

*Sep 2016 – Jun 2020*

- **Coursework:** Algorithms and Data Structures in Java, Mathematical Analysis, Numerical Calculus, Economics and Business Organization, Physics 1–3, Geometry and Algebra, Computer Science for Engineering, Databases and Information Systems, Electrical Engineering, Fundamentals of Automatic Control, Fundamentals of Electronics and Electronic Devices, Operating Systems, Optimization Methods, Industrial Automation, Electrical Machines, Applied Mechanics, Digital Control, Fundamentals of Measurement, Fundamentals and Networks of Telecommunications. ([Course information](#))
- **Thesis:** *Knowledge Representation and Automated Reasoning for Affective Computing from Biosignals.* ([PDF](#))

## Selected Projects

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**Digital Twin for Ackermann Robot (ROS2/Nav2)**

*mobile-robotics*

- **Implemented autonomous navigation stack with Gazebo simulation** – ROS2 Nav2, OSM map. *fast scenario iteration and repeatability.*

**Open Authenticator (HOTP/TOTP)**

*open-authenticator*

- **Developed RFC-compliant OTP generation libraries from scratch** – Java, C++. *cross-platform, privacy-focused 2FA.*

**Wearable VOC Monitoring System**

*firefiot*

- **Created wearable IoT system for industrial VOC monitoring** – MQTT, Arduino, Raspberry Pi. *real-time environmental data acquisition.*

**QRLog Authentication Prototype**

*qr-log-demo*

- **Implemented modern authentication with QR code login** – Quarkus, WebSocket, DDD. *real-time secure login flow.*

## SRAP — Prosthetic Arm Control System

[srapt](#)

- Developed control algorithm for a prosthetic arm driven via EMG signals – C, STM32 Nucleo. integrated hardware design and neurophysiological signal processing.

## CNS Live — Real-Time Streaming Platform

[cns-live](#)

- Built open-source platform for live streaming and VOD with RTMP and HLS/DASH – Angular, Node.js, ffmpeg, WebSockets. real-time user metrics and adaptive streaming.

## BariNAV — RL Route Planning Agent

[ai-for-automation](#)

- Designed reinforcement learning agent for optimal path planning in urban environments – Python, RLLib, SUMO, TomTom API. integrated traffic data for realistic simulation.

## Apulia4All — Accessibility Web App (Hackathon)

[apulia-4-all](#)

- Developed inclusive tourism web app integrating environmental and accessibility datasets – Svelte, Node.js, TypeScript, OpenStreetMap. presented at OpenTusk Hackathon 2023.

## GDCache — Caching Library for GDScript

[gdcache](#)

- Created caching library with multiple replacement policies and performance metrics – GDScript. open-source project with abstract extension points.

## Publications

- Development of a Digital Twin for Autonomous Navigation Simulation of an Ackermann-Steering Vehicle (Jun 2025)
- Development of a Multi-Objective Agent Based on Reinforcement Learning (RL) for Path Planning in Urban Environments (Dec 2024)
- Development of an Interactive Web Platform for Livestreaming Based on ffmpeg and Adaptive Video Format (Dec 2023)
- Design of a Black-Box Analysis and Identification Model of a Permanent Magnet Synchronous Motor in Steady-State (Jul 2023)
- Prototyping and Control of a Transradial Robotic Prosthesis Based on Surface Electromyography (Oct 2022)
- Wearable IoT System for Personalized Monitoring of VOCs in Manufacturing Companies (Jul 2021)
- Knowledge Representation and Automated Reasoning for Affective Computing from Biosignals (Jun 2019)