Gonzalo Combarros Hernández

Senior Firmware / Embedded Systems Engineer
Spain · Open to Remote (EU)
gocombar@gmail.com · LinkedIn

PROFESSIONAL SUMMARY

Senior Firmware / Embedded Systems Engineer with 10+ years of experience owning and delivering **production-grade embedded firmware** for **consumer IoT devices**. Specialized in **FreeRTOS-based system architecture** on ESP32 and STM32, covering low-level drivers, task orchestration, and scalable firmware infrastructures. Extensive hands-on experience designing and operating **end-to-end OTA update systems** (bootloader, validation, rollback, and controlled cloud-driven releases) for devices deployed in the field. Strong background in **manufacturing support, production ramp-up, and field issue resolution**, combined with deep technical ownership and architectural decision-making. Recognized for building robust firmware platforms that enable long-term product evolution and reliable operation at scale.

CORE TECHNICAL SKILLS

Embedded Firmware & Architecture
- Embedded firmware development in **C / C++**
- **FreeRTOS-based architectures** (ESP32, STM32)
- System-level firmware architecture design and ownership
- Task scheduling, state machines, and inter-task communication
- Low-level driver and HAL development
- Low-power design, performance and reliability optimization

MCUs & Platforms
- ARM Cortex-M (STM32)
- ESP32 (Xtensa)
- PIC

Connectivity & Protocols
- BLE
- Wi-Fi
- MQTT, HTTP
- SPI, UART, I²C

Production, OTA & Industrialization
- End-to-end OTA processes for commercial products (bootloader integration, flashing, integrity checks, rollback)
- Release management and firmware rollout coordination
- Manufacturing bring-up and production ramp-up support
- Validation, debugging, and root-cause analysis of production and field issues
- Internal tooling and test infrastructure for production environments

Tooling & Engineering Workflow
- Git-based workflows and versioning strategies
- Python for tooling, automation, and test infrastructure
- Linux-based development environments
- Cross-functional technical leadership with hardware, QA, cloud and manufacturing teams

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PROFESSIONAL EXPERIENCE

Senior Firmware / Embedded Systems Engineer

Welltech Electronics – Vizcaya, Spain
Nov 2021 – Present

- Designed and owned the FreeRTOS-based firmware architecture for consumer IoT devices, acting as the principal firmware engineer and technical reference for the product.
- Developed and maintained production-grade firmware on ESP32 and STM32 platforms, including low-level drivers, HAL layers, system services, and extensible command and feature infrastructure.
- Architected and led the full OTA and production firmware lifecycle for commercially deployed devices, including bootloader integration, secure flashing, integrity validation, rollback mechanisms, release testing, cloud-based distribution, and successful rollout to hundreds of devices in the field, while supporting manufacturing bring-up and production ramp-up.
- Integrated algorithms originally developed and validated in Python into embedded C/C++ firmware, adapting them to real-time and resource-constrained environments while preserving functional behavior and performance.
- Designed and implemented simulation, data logging, and analysis workflows to validate embedded algorithm behavior, including datalogger tools, offline analysis, and controlled end-device sessions for algorithm tuning and calibration.
- Built internal tooling and test infrastructure (Python-based) to support firmware validation, diagnostics, and production processes.

- Collaborated closely with hardware, cloud, QA, and manufacturing teams, driving technical decision-making and long-term firmware evolution.

Embedded / Electronic Engineer – Production & Validation

Sistemas Digitales de Control 2002 – Logroño, Spain
Feb 2020 – Oct 2021

- Played a key role in **production engineering and manufacturing operations**, supporting planning, execution, and validation of electronic equipment in an industrial environment.
- Led **production validation and acceptance testing** of electronic systems, ensuring product quality, functional compliance, and readiness for delivery.
- Managed **production workflows**, including work orders, generation of technical and quality documentation, verification of production outputs, and coordination of logistics, transportation, and customer deliveries.
- Acted as technical owner for **defective unit management**, handling fault tracking, root-cause analysis, corrective actions, and communication with customers.
- Performed **electronic fault analysis and troubleshooting** on defective units, including schematic review, component-level diagnosis, and corrective actions.
- Participated in **PCB validation during prototype phases**, supporting early detection and resolution of hardware design issues.
- Contributed to **quality management processes**, including documentation, continuous improvement initiatives, and creation of internal tools and forms to streamline production and validation tasks.

R&D Embedded / Electronic Engineer

Footwear Technology Center of La Rioja (CTCR) Arnedo, Spain
Oct 2016 – Nov 2019

- Led multiple **industrial R&D projects** focused on the integration of electronics and embedded systems into footwear manufacturing processes, acting as **technical project owner** and main engineering contact.
- Designed and deployed **RFID-based solutions** for footwear stock control and production traceability, including system architecture, field testing, equipment layout, supplier coordination, tag selection, electrical cabinet assembly, and on-site validation.
- Developed an **intelligent robotic sanding system** for footwear manufacturing, programming **KUKA industrial robots** to dynamically adapt sanding trajectories based on real-time mapping of shoe lasts generated by an external computer system.

- Coordinated closely with clients and maintenance teams during **on-site installations**, including safety-related integrations and commissioning of robotic systems in production environments.
- Designed and prototyped a **smart cycling boot** for real-time power measurement, integrating embedded electronics and sensors into footwear, developing the **embedded firmware**, and performing calibration, testing, and validation of sensing algorithms.
- Participated in the European **Maturolife project**, developing a **smart textile footwear demonstrator**, including pressure sensor insoles with **BLE connectivity**, real-time data transmission to smartphones, and cloud integration via **MQTT**.
- Contributed to project planning, technical documentation, budget preparation, and collaboration with multidisciplinary teams and industrial partners.

Embedded Software Engineer

Jofemar S.A. – Navarra, Spain
Nov 2015 – Oct 2016

- Developed **embedded firmware in C for PIC microcontrollers** used in commercial vending machines.
- Designed and implemented a **USB-to-Ethernet gateway** enabling integration of barcode readers with vending machine controllers, allowing **remote validation and control of locker access** based on barcode scans queried against a central server.
- Developed **validation and test utilities** for vending machine subsystems, including PCBs and electromechanical components, supporting functional verification and production testing.
- Performed **hardware-related support tasks**, including sensor feasibility studies, schematic review, and assistance during prototype validation phases.

Silicon Validation Engineer (Internship)

Marvell – Valencia, Spain
Jul 2014 – Apr 2015

- Worked within the **Silicon QA / Validation team**, performing **functional, performance, and thermal validation** on early production batches of integrated circuits.
- Executed **performance and power characterization tests** across multiple operating conditions, identifying variability between silicon units produced during initial manufacturing runs.

- Conducted **statistical analysis of test results** to evaluate performance dispersion, power consumption differences, and yield-related behavior across chip samples.
- Supported validation workflows through the development of **basic scripts and tools** to automate testing and data collection.
- Contributed to internal documentation and validation reporting processes in collaboration with senior silicon and QA engineers.

EDUCATION

Master's Degree in Electronic Systems Engineering
Polytechnic University of Valencia
Specialization: Electronic Energy Conversion Systems

Bachelor's Degree in Industrial Engineering
University of La Rioja
Specialization: Industrial Electronics

CERTIFICATIONS & TECHNICAL TRAINING

- **RISC-V Foundational Associate (RVFA) Certification**
- Advanced Programming in Collaborative Robotics (Universal Robots)
- Expert Programmer in KUKA Industrial Robotics
- Python Development on Raspberry Pi
- Production Management and Introduction to Lean Management

CONFERENCES & PUBLICATIONS

- *Development of a Wireless Sensor Network for Landslide Monitoring*
  17th International Congress on Project Management and Engineering
- *Use of Wireless Sensor Networks to Control Landslides Interacting with Infrastructures*
  Lecture Notes in Management and Industrial Engineering