Roberto Ibáñez Mingarro

Electronics & Embedded Systems Engineering Student

linkedin.com/in/robertoibanezmingarro
robertoibanezmingarro.github.io/web/
robertoibanezmingarro@gmail.com
+34 681 631 715

Education

MSc in Electronics and Automation Engineering — INSA Toulouse (France) Sept. 2024 – Present

- Expected graduation: September 2026.
- **Specialization in Embedded Systems.**
- Focus on advanced circuit design and control systems.
- Strong adaptability to complex engineering environments.

BSc in Industrial Technologies Engineering — Universitat Jaume I (Spain) Sept. 2022 – Present

- Expected graduation: September 2026.
- **ARA Program Member**: High Academic Performance program with limited enrollment, small cohorts, and strong emphasis on research and instruction in English.

MSc in Industrial Engineering — Universitat Jaume I (Spain) Sept. 2026 – Planned

- Expected start: September 2026; **admission confirmed** through the INSA Toulouse–UJI double-degree pathway.

Experience and Projects

Reverse engineering of MP4 player (SPC Int. 8488, from 2014) — Personal project Jan. 2026 – Present
Design & fabrication of a digital wattmeter with PCB (KiCad) — INSA Toulouse Sept. 2025 – Nov. 2025
Autonomous sailboat control system using STM32 (embedded) — INSA Toulouse Sept. 2025 – Nov. 2025
Design & control of an autonomous car for NXP Cup (embedded) — INSA Toulouse Sept. 2025 – Present
Design and simulation of an 8-bit CPU in VHDL (RTL architecture) — INSA Toulouse Sept. 2025 – Nov. 2025
Independent development of an IDE using Python & PySide6 — Personal project Jun. 2025 – Present
STEM Tutor (Mathematics & Physics for High School) — Academia Romar (Burriana) Oct. 2022 – Jun. 2024

Technical Skills

PCB design and circuit simulation: LTSpice, KiCad, Altium Designer, Simulink, Proteus 9 Professional
Development platforms: STM32 (NUCLEO F103-RB), BASYS 3 (AMD FPGA), ESP32
Digital Design & Verification: RTL design (VHDL), testbench development, simulation debugging, FPGA
Programming languages: C, C++, Python, ARM Assembly (Cortex-M), MATLAB, Java, SQL, R
Computer-Aided Engineering and Design (CAD): SolidWorks, AutoCAD, Ansys
Office and documentation tools: LaTeX (Overleaf), Microsoft Office, LibreOffice, Google Workspace

Languages

English: C1 **French:** B2 **Valencian:** C1 **Spanish:** Native

Additional Information

Valid driving license and own vehicle. Willingness to travel. Selected technical project details provided on the following page. Additional documentation available at **robertoibanezmingarro.github.io/web/**.

Selected Technical Projects

Technical highlights aligned with digital design, verification mindset, and embedded validation.

Design Verification & Digital Design

8-bit RISC CPU in VHDL (RTL) — Pipelined Architecture

- Designed a register-oriented RISC microprocessor based on a 5-stage pipeline (LI/DI/EX/MEM/ER).
- Implemented RTL modules in VHDL: ALU, 16-register file (dual-read/single-write), control unit, memory interface.
- Developed dedicated testbenches and performed structured simulation debugging via waveform analysis.
- Applied modular RTL design with verification-oriented iteration (isolate, fix, regression re-test).
- Addressed pipeline data hazards and register read/write consistency constraints.

Autonomous Embedded Control System (NXP Cup Platform)

- Designed real-time control loops integrating sensor acquisition and actuator response.
- Debugged hardware–software timing interactions under physical constraints.
- Applied incremental validation with structured experimental testing.
- Emphasis on reproducibility, robustness and deterministic embedded behavior.

Embedded Systems & Hardware Validation

Autonomous Sailboat Control System — STM32 (Register-Level Programming)

- Developed full embedded architecture on STM32F103 (Cortex-M3) using direct register configuration (no HAL).
- Implemented custom drivers: RCC, GPIO, NVIC, timers (PWM, encoder, input capture), SPI, I^2C, USART, ADC, DMA.
- Designed interrupt-driven control logic with explicit priority management.
- Integrated IMU sensing, encoder acquisition, servo control, motor driver and UART wireless link.
- Performed laboratory validation and structured bring-up procedures.

Digital Three-Phase Wattmeter — Custom PCB Design & Measurement Validation

- Architected modular multi-board measurement system (analog front-end, STM32 acquisition, power stage).
- Designed signal conditioning and analog low-pass filtering for PWM noise attenuation.
- Achieved targeted measurement precision better than 0.5%.
- Executed full PCB workflow: schematic, layout, DRC, Gerber export, isolation milling and inspection.
- Conducted structured power-up validation and ADC sampling verification.

Reverse Engineering & System-Level Analysis

MP4 Player Hardware Architecture Reconstruction

- Reconstructed system architecture under limited documentation through systematic hardware inspection.
- Performed PCB layer inference and component-level functional hypothesis validation.
- Created verified KiCad symbols, footprints and reusable custom component libraries.
- Developed progressive functional block diagrams and schematic reconstruction.
- Initiated 3D CAD validation to confirm mechanical and connector alignment constraints.

Semiconductor-Oriented Focus

- Transistor-level CMOS digital design (inverter, NAND, master–slave D flip-flop).
- Timing and power characterization across process corners (min/typ/max).
- Strong interest in ASIC digital architecture and verification-driven design.
- Expanding knowledge in SystemVerilog and verification methodologies.

Detailed technical articles, schematics and validation material available at: **robertoibanezmingarro.github.io/web/**