

# Oussama Darouez

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## Skills

- **Programming:** C, C++, Assembly, Python, Bash
- **Protocols:** UART, SPI, I2C, USB-CDC, CAN, Ethernet, TCP/UDP, Wi-Fi, Bluetooth
- **RTOS:** FreeRTOS
- **Version Control:** Git, GitHub
- **CI/CD:** GitHub Actions, Docker
- **IDEs:** VS Code, Eclipse, STM32CubeIDE, Arduino IDE, ESP-IDF, MPLAB X, PlatformIO
- **Build Tools:** CMake, Makefile
- **Robotics:** micro-ROS, ROS2
- **Hardware Design:** SolidWorks, KiCad

## Experience

- Mare Custos – Tunisia**  
*Firmware Engineer*

Jul 2024 – Present

  - Built a robust dual-slot OTA firmware update system over Ethernet on an STM32U5, integrating advanced bootloader logic, reset cause handling, NVS version tracking, and automated fallback for corrupted updates.
  - Created reusable peripheral and module wrappers for STM32 and ESP32, improving code maintainability and portability.
  - Designed and implemented custom micro-ROS transport layers for STM32, enabling efficient and reliable communication.
  - Wrote comprehensive unit tests in Unity C, ensuring stable firmware releases and reducing post-deployment bugs by 90%.
  - Fixed GitHub Actions workflows for automated firmware builds, improving CI/CD efficiency and reducing build failures.

**Technologies:** Ethernet (TCP/UDP), USB-CDC, SPI, ADC, DMA, PCNT, CRC, STM32, ESP32, FreeRTOS, micro-ROS, ROS2, PlatformIO, STM32CubeIDE, Docker, Git, GitHub Actions, Unity C, Linker Scripts, Startup Files, Bootloader, NVS, Reset Handler, OTA, Patch Files

**Methodologies:** Agile (Scrum)
- Orange Tunisie – Tunisia**  
*Embedded System Engineer Intern*

Jun 2024 – Jul 2024

  - Developed and optimized FreeRTOS-based task scheduling on ESP32 with UART communication to Raspberry Pi and explored digital sound processing using the I2S protocol.

**Technologies:** FreeRTOS, UART, I2S, ESP32

## Projects

- OTA-Enabled Smart Plug IoT Device – Freelance Project**

Aug 2025 – Present

  - Developed the OTA partition on an ESP32 with Wi-Fi SmartConfig, automatic device registration, and firmware versioning.
  - Added fault-tolerant features including failsafe modes, LED indicators, and button commands to ensure reliable operation.
  - Utilized NVS for persistent configuration storage, allowing device settings to be retained.

**Technologies:** Wi-Fi, HTTPS, OTA Firmware Updates, NVS, FreeRTOS, ESP-IDF, Git, ESP32
- Eurobot – INSAT, Tunis, Tunisia**

Sep 2022 – Apr 2023

  - Led the mechanical design of two robots, ensuring precise integration between hardware and software components.
  - Designed and built custom GPIO HATs and servo circuits with optocoupler isolation to protect microcontrollers.
  - Implemented advanced PID control on STM32 with ROS1-based communication, achieving precise movement.

**Skills:** Arduino, STM32, PID Control, ROS1, PCB Design, 3D Printing, SOLIDWORKS, KiCad

## Community Involvement

- Discovery Club Junior – Manouba, Tunisia**  
*Robotics Instructor*

May 2023 – May 2025

  - Taught electronics, PCB design, logic design, C/C++ programming, and Atmega328P register-level programming to students.
  - Served as a mentor at Robocup Asia Pacific 2024 in South Korea.
- All-China Youth Federation – China**  
*Forum Attendee*

Nov 2024

  - Attended the Chinese-Arab Youth Development Forum in China, participating in discussions on technological innovation.

## Education

- National Institute of Applied Science and Technology – Tunis, Tunisia**  
*Industrial Computing and Automation Engineering*

Sep 2021 – Present

## Languages

Arabic: Native — French: Professional Working Proficiency — English: Professional Working Proficiency