

# Tarik SEMRADE

## Low-Level Embedded Systems Software Engineer

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I received an electronics and embedded systems engineering degree from ENSA-Marrakech engineering school of the UCAM University-Morocco, in 2017. My latest main role was as a Low-level software and critical software development engineer. My interests lie in automotive, aerospace, and power electronic drivers. During my professional experience and education courses, I gathered skills in the field of control systems using microelectronics, low-level software development using C language, assembly code and, drivers for microelectronics (Microcontrollers, TI DSPs, ARM, STM32, PIC, NXP ... etc).

## FORMATION

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2017 **Engineering school**, *National School of Applied Science of Marrakech Morocco*.  
Engineering Diploma on Embedded and Control Systems,  
Graduation September 2017

## SKILLS

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Programming	C/C++ and Low level C , Microsoft .Net (C#), Python, TCL/TK, ADA.
FPGA	VHDL
Controller and Processor	NXP, DSP, ARM Cortex-M, PIC, Nios, Arduino, ESP, STM32.
Peripherals	ADC, UART, SPI, DAC, ECAP, EPWM, Timers, CMPSS, ISR, Analog Mux, CAN, CMU.
Debugging	XDS200, Isystem IC5000(winIDEA), Lauterbach
Middleware	wxWidgets, wxPython.
Systems	Mac OS X, Windows 10, Windows 7, Linux
Simulation	Matlab/Simulink, PLESC, PSIM, dSPACE 1104, dSPACE 1202.
Communication	UART, CAN, SPI.
Verification and Unit Test	RTRT and DO-178B, Python(doctest), Cantata.
PCB Board	Altium Designer, Protel.
IDE development	IntelliJ Idea, Eclipse, Visual Studio Code, Code Composer Studio, Keil, CubeIDE, Git, Cu-beMX
Linux	System administration, sockets, TCP, installation, C

## PROFESSIONAL EXPERIENCE

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Present  
February 2023

## Senior Embedded Software Engineer, EMBEDDED SEMRADE, Toulouse

### > Intern : Embedded Semrade

- > ISM330DLC 3D accelerometer and 3D gyroscope drivers and application on STM32F429I in C++.
- > L3GD20 gyroscope driver and application on STM32F429I in C.
- > Soft NIOS Processor on ALTERA Cyclone IV EP4CE6F17C8 FPGA, C project using Eclipse.
- > Embedded Linux on Raspberry Pi 4 in C :
  - Kernel.
  - LibC.

- > Django-based web development (Nginx, Unicorn), Redmine/Trac installation, Roundcube + Dovecot + Postfix setup.
- > 3D Printing and FreeCAD on K1 Max Creativity.

### > SAFRAN Cabine : Avionics (Development under DO-178B standard)

- > Migration of a project from single-core to dual-core (TMS320F280049 to TMS320F29379D).
- > Implementation of Scalar ACI and 120° Motor Control for a 20 kW PMSM on dual-core TMS320F28377D DSP in C.
- > Development of a bus voltage control application on TI dual-core TMS320F28377D DSP.
- > Creation of design documentation compliant with DO-178B guidelines.
- > Development of DSP Drivers (TMS320F28377D) : SDFM, EMIF, GPIO, ADC, ECAP.

### > HENSOLDT Nexeya France : Defense

- > Technical support for low-level critical software with stringent real-time constraints.
- > Technical lead and DSP expert on TMS320F28379D : explanations, code development, debugging of complex issues.
- > Expertise in dual-core DSP architectures.
- > Experience with Vienna Rectifier topology (PFC) using active IGBT switches.
- > Proficiency in 5 kW / 10 kW DC/DC phase-shifted full-bridge.
- > Work in a highly critical environment requiring autonomy, stress management, rigor, and resilience.
- > CPU1 and CPU2 Flashing via USB.

### > ICube Research France : Energy

- > External analysis of a pulsed DCDC power supply project.
- > Support and advice on architectural choices.
- > Development on TMS320F28335.
- > Code review, solution analysis, and power electronics guidance.
- > De-risking of selected solutions.

### > Motor Control – TI TMDXIDDK379D (DesignDRIVE IDDK v2.2.1)

- > Open-loop control on RL load.
- > Implementation on TMS320F28379D/388D.
- > Creation of a lightweight OS handling periodic tasks (10 ms, 100 ms, 1 s).
- > Current measurements using Shunt, LEM, and SDFM.
- > PMSM FOC control : current, speed, position loops + PI tuning.
- > Integration of 17-bit incremental encoder via ECAP with speed computation on CLA.
- > CAN bus (periodic + ISOTP) with PU → physical value conversion.
- > Python graphical interface.

### > FPV Drone Project (First-Person View)

- > Project analysis, design, cost estimation, planning.
- > Assembly : frame, motors, ESCs, FC, ELRS, GPS, buzzer, LEDs, camera, DJI O3 VTX.
- > Betaflight configuration : tuning, OSD, filters, PID, RATEs, Blackbox.
- > Calibration of DJI Goggles 3 and TX16S radio.
- > Integration of RF systems for video + telemetry.
- > Video + telemetry capture via DJI O3 + ExpressLRS.
- > Integration of BME280 for accurate altitude measurement.
- > Addition of INMP441 microphone on ESP32-C3 with SD recording for audio analysis.

C C++ Code Composer Studio STM32 DSP TI FPGA Linux Integrity Migration

February 2023  
September 2022

## Embedded Linux Software Engineer, ABSOLUT SENSING, Toulouse

- > Embedded Linux build and cross-compilation Raspberry PI (ARM), SBC(Intel Atom).
- > Ethernet and USB cameras acquisition using Aravis library in C using Eclipse on Ubuntu.
- > Remote debugging and programming in C++ using the Pleora SDK (Camera link to Ethernet bridge).
- > Camera link serial communication Driver development using C++ on Linux.

Linux Eclipse Ubuntu VScode

August 2022  
December 2018

**Capgemini Engineering-Toulouse, LOW LEVEL EMBEDDED SOFTWARE ENGINEER, LIEBHERR**

- > Low-level software development on Texas Instrument **Delfino DSPs (TMS320F28379D)**.
- > Multi-core communication and driver development (**IPC, CLA, and system clock**).
- > CPU improvement and **Scade** migration in **C language** to the **C28 and CLA**.
- > Usage of **JIRA** and **SVN**.

**ACTIA**

- > Low-level **C** code migration, integration, and testing on **NXP Power PC MPC5748G 32bits** (Calypso family).
- > Module design documentation for CESAM generic platform (Smart Power Driver and Clock Monitoring Unit).
- > Module implementation in **C language**.
- > Integration testing and requirement traceability using **REQTIFY**.
- > Debugging with **WinIDEA** and **IC5500/5700**.
- > Test sheet creation, requirement traceability, and analysis (**REQTIFY**).
- > Code review and merge requests in **GitLab**.
- > DC motor and bulb control using high-side switches (**MC10XS4200, MC20XS4200, and MC06XS4200**).
- > **SPI** communication in daisy chain configuration.
- > Use of **JIRA** for agile project management.
- > Worked with **NXP DEVKIT-MPC5748G-ND** and **KIT20XS4200EVBE**.

**Hyperloop TT**

- > Developed **PMSM** and **BLDC** sensorless control software.
- > P.I.D regulation and simulation using **Matlab/Simulink**.
- > Power supply for thermal testing and DC/DC current regulation development in **C language** on **STM32F407**.
- > Filtering (**F.I.R** and **I.I.R**) using **STM32F407** Discovery board.
- > Configuration of gateway device for **CANopen** to **Profibus** communication.
- > Field-oriented control for linear synchronous motors using Texas Instruments algorithms.
- > Hardware testing and curve analysis using **Picoscope** oscilloscope.

**Safran Ventilation Systems**

- > Sensorless **FOC** for **ACI** machine control at 20,000 RPM using **multi-core TMS320F28379D** in **C language**.
- > Sensorless **FOC** for **PMSM** machine control at 20,000 RPM using **TMS320F280049C**.
- > **FFT** for mechanical resonant frequency detection; basic software development on **TMS320F280049** and **TMS320F28379D**.
- > Low-level development in **C language** for **ADCs, CMPSSs, ECAPs, SPIs, SCIs (UART), Timers, etc.**
- > Real-time control toolkit using **UART** in **C**.
- > Developed control algorithms (**PIDs, SVM, Filters, protection mechanisms**) and speed estimation.
- > Implemented 3-phase driver controls using **EPWM** for **DSPs**.
- > **Matlab/Simulink** and **PSIM** software development and migration to **C** for Texas Instruments **DSPs**.
- > Supported high-speed motor testing and hardware experiments.
- > Algorithm documentation following Safran standards and configuration management using **Integrity**.

Code Composer Studio Integrity GitLab windchill JIRA REQTIFY IC5500 WinIDEA Tortoise Git

September 2018  
January 2018

**Software Developer , CONTINENTAL, AKKA Technologies-Toulouse**

- > ASW development of Renault specification in **C language** on a multi-core platform.
- > **Matlab/Simulink** systems development in **C language**.
- > Continental data conversion : Floating Point and Fixed Point.
- > Test scripting, analysis, correction, and verification (**MCDC code coverage**).
- > Compilation errors analysis of stubbed data and functions.
- > Automation of repetitive tasks using **Python** language.
- > Test bench validation : Flash and debug.
- > **Check-in/out** on the Continental configuration server (**Integrity**).
- > Continental quality process for the engine control unit.
- > **Cycle-V-Model** of Continental Engine System Process.
- > **Pc-Lint** execution and correction of errors.

RTRT Eclipse RTRT Integrity

September 2017  
April 2017

### Graduation finale project, GSMaintenance, Paris

- > Static Var Compensator (SVC) modelization and simulation.
- > Real-time measurement of currents and voltages provided by EDF grid.
- > Basic C language development of the control law, digital filters, digital PIDs, and computing in
- > VHDL Development on Spartan-3 FPGA the state machine for thyristors converter pulses generation.
- > Calibration of analog filters, amplifiers, and regulators.
- > Dimension of inductance and capacitances for 400V AC electrical grid.
- > Real-time reactive power control in a 400 V (AC) 3-phase electric system.

Code Composer Studio Protel Matlab/Simulink electronics

## LANGUAGES

Français



Anglais



## FORCES

- > passionate
- > motivated
- > autonomous

## INTERESTS

- > RTOS for DSP and STM32F.
- > Robotic Systems.
- > personnel Development.
- > Badminton.
- > Traveling.
- > Psychology.

## PROJECTS

### ACADEMIC PROJECT

JAN 2014 - JAN 2017

- > Development of the "bit stuffing" state machine using VHDL language on Altera FPGA using Quartus
- > Development of the same state machine in C for resulet comparison between the FPGA model and the C language.
- > Model, tests automation on ModelSim via TCL. Graphical user interface using C.

VHDL ModelSim TCL C language

### 3-PHASE MOTOR CONTROL BASED ON TEXAS INSTRUMENTS DSP

MARCH 2020 - SEPTEMBER 2020

- > Altium Designer for PCB Manufacturing, layout, footprint, Schematics, PCB, and 3D Model visualization.
- > Power board design for 3phase motor control (ACI, PMSM and BLDC) using C2000 launchPad XL TMS320F28379D. Powerboard is connected to the AC grid (Input voltage is 230V, DC voltage to the input inverter is 100V.600V, 0-20A DC).
- > Code Composer Studio for Embedded C/C++ Software.
- > DSP (TMS320F280049 and TMS320F280049C).
- > Matlab/Simulink and Plecs for simulation.
- > Diode Rectifier.
- > Flying Capacitor DC-DC Converter.
- > Direct Flux Vector Control, 3phase inverter.

Altium Designer 20 Code Composer Studio PLECS PSIM