Diogo Filipe Rodrigues

Power Electronics and Converter Control Engineer

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Professional profile

Electrical engineer with experience since 2020 across power electronics, embedded firmware, converter control and automotive hardware. Contributed to a 250 kW EV charging module from circuit simulation and prototype debugging to firmware and laboratory validation. Currently develops converter control software for wind turbines, using C, SQL analysis and emulation to investigate field issues and improve operation.

Professional experience

Converter Control Engineer

Vestas via Capgemini | Jan 2026 - Present

- Develop and correct converter control software in C for wind turbines; develop MATLAB tools and technical documentation.
- Investigated false startup alarms using SQL queries across alarm records from multiple turbine variants and software versions. Selected candidates using startup timing, acknowledgement behaviour and recurrence criteria. Analysed alarm-generating C code, corrected software causes and introduced startup suppression windows where hardware and software initialization were asynchronous. Validated in converter emulation and a test turbine, reducing false alarms and non-production periods.
- Investigated reactive-power transients across the power plant controller (PPC) and turbine converter. Corrected the converter's reported reactive-power capability in Off and other states, mitigating spikes when operation resumed. Validated the reactive-power correction with converter/PPC emulation and field tests conducted by the issue reporters; analysed measured Q, PPC requests, converter references and operating states.

Power Electronics Engineer

i-charging | Sep 2023 - Dec 2025

- Contributed across the development lifecycle of an in-house 250 kW module for a modular Megawatt Charging System (MCS) for heavy-duty electric vehicles.
- Simulated and debugged prototype circuits for signal conditioning, measurements, hardware supervision and protections; selected a DC/DC gate driver and developed a dedicated board, including circuit validation and corrections.
- Developed control-board firmware for voltage/current/temperature acquisition, contactor and MOSFET status, OTA updates, software supervision, AC/DC input-stage control and main DC/DC control.
- Performed open-loop tests with passive loads and closed-loop tests with bidirectional loads up to 500 kW, including two modules operating in parallel; carried out board rework and layout of one board.
- Used LTspice, PSIM, Altium, STM32CubeIDE, BUSMASTER and Kvaser CAN interfaces. The team's 250 kW module reached readiness to begin certification, with output ranges of 0-1250 V and 0-250 A, subject to rated-power limits.

Hardware Engineer

Continental Engineering Services | Nov 2021 - Sep 2023

- Contributed to a 3.5 kW bidirectional DC/DC converter supplied by a 48 V battery: synchronous buck schematics, circuit validation and MOSFET-loss analysis to assess parallel-device configurations. Development progressed to certification testing.
- Investigated and proposed improvements to cell monitoring and balancing circuits in an internal BMS project; evaluated an integrated monitoring/protection solution using the supplier's LTspice model.
- Supported the hardware architecture of an autonomous EV charging robot and implemented vehicle-module subsystems. Produced Visio diagrams and Zuken schematics, reviewed by the project lead; the project stopped before completion.

Power Plant Control Engineer Trainee

Vestas | Nov 2020 - Nov 2021

- Evaluated a third-party power meter requested for a German customer, comparing PPC behaviour with the standard measurement device. Reviewed equipment documentation and MATLAB/Simulink control functions; compared active power, reactive power and voltage reference tracking, response times, overshoot and oscillations.
- Developed automated scripts in Vestas' proprietary test language, ran simulation/emulation tests and remotely executed tests on a real German wind power plant; documented results and presented conclusions to stakeholders. Validated use of the alternative meter while documenting performance differences. Worked with Solution Centre, Studio 5000, Git, Jira and Confluence.

Technical skills

Power electronics: AC/DC and DC/DC converters; bidirectional converters; gate drivers; MOSFET losses; signal conditioning; hardware and software protections; open-loop and closed-loop control.

Embedded software and data: C; C++; Python; SQL; STM microcontrollers; STM32CubeIDE; CAN; firmware updates over the air (OTA); BUSMASTER; Kvaser.

Design and simulation: MATLAB/Simulink; PLECS; PSIM; LTspice; PSpice; Multisim; Maple; Altium; Zuken CR5000 and Design Gateway.

Laboratory and delivery: Oscilloscopes; multimeters; bidirectional power supplies and loads; soldering and board rework; Git; Jira; Confluence; Visio; technical documentation.

Education

MSc in Electrical and Computer Engineering | FEUP, University of Porto | 2015 - 2020

Major in Automation, Electronic Systems; average grade 16.7/20.

Erasmus exchange | University of Southern Denmark, Odense | Sep 2018 - Jan 2019.

Thesis: isolated bidirectional DC/DC converter modelling, linearization and PID control in MATLAB/Simulink and PLECS. SDU project: 480 W Two-Switch Forward prototype, topology selection, loss analysis and testing.

Teaching and additional experience

Teaching Assistant | FEUP | Sep 2019 - Mar 2020. Supported Electrical Machines and Projecto FEUP classes, covering transformers, motors/generators, circuit fundamentals and laboratory equipment. Also tutored university students.

Languages

Portuguese native | English C1 | Spanish B1 | German A1 (A1.1 and A1.2 certificates).