

ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

MUR DM 117/STMicroelectronics - Advanced Power Management Integrated Circuits for Next-Generation Sustainable Vehicles

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] STMICROELECTRONICS S.R.L. [P.iva/CF:00951900968] Politecnico di TORINO [P.iva/CF:00518460019]
Supervisor	CROVETTI PAOLO STEFANO - paolo.crovetti@polito.it
Contact	CROVETTI PAOLO STEFANO - paolo.crovetti@polito.it
Context of the research activity	<p>The PhD research program is focused on the development of innovative, highly reconfigurable and energy efficient power management integrated circuits in smart power bipolar-CMOS-DMOS (BCD) technologies targeting the requirements of next-generation environmentally sustainable vehicles.</p> <p>Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23002000004</p>
Objectives	<p>The power management integrated circuits (ICs), which are needed to generate the supply voltages for electric and electronic systems in vehicles, have always played a key role in automotive electronics. In recent years, the rapid transition towards electrification and the development of advanced driving assistance systems (ADAS) based on new sensors such as LIDAR and on artificial intelligence (AI) entail a radical change in the characteristics and requirements of power management ICs, and require a significant research effort to ensure the required levels of performance, reliability and energy efficiency.</p> <p>In this context, this PhD research program is focused on the development of innovative, reconfigurable and highly power efficient integrated circuits in bipolar-CMOS-DMOS (BCD) technologies targeting Point-of-Load power converters based on next-generation digital control techniques and/or on emerging semiconductor technologies (e.g. GaN), such as to meet the needs of new vehicles with low environmental impact and advanced driving support systems.</p>

In particular, power converters with a high switching frequency will be investigated, such as to allow a high degree of miniaturization and integration, eliminating or reducing to a minimum the number and dimensions of external passive components (in particular of inductors).

In details, the doctoral activity entails the study and development of innovative architectural and control solutions throughout the project cycle, starting from the very high-level design (mainly carried out at the University), to transistor-level design (activity carried out at STMicroelectronics premises with reference to the new generation BCD technologies used in the automotive field), physical implementation on silicon, test-chip fabrication and lab testing.

Skills and competencies for the development of the activity

Excellent academic background and skills in Electrical/Electronic Engineering. Familiarity with the IC design and simulation flow (Cadence environment) and/or with Power Electronics (power converters, control techniques) and/or Automotive Electronics are a plus.