

ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

New solutions for transportation electrification

Funded By	Politecnico di TORINO [P.iva/CF:00518460019]
Supervisor	GRIVET TALOCIA STEFANO - stefano.grivet@polito.it
Contact	
Context of the research activity	Innovative power conversion solutions in transportation electrification, including systems for vehicular traction and aviation propulsion, the related charging converters and infrastructure, their electro-magnetic compatibility and their interaction with the power grid.
Objectives	Transportation electrification is driving a change of paradigm in three fundamental industries such as the automotive industry, the aviation industry and the electric power industry. Electric power conversion is at the forefront of this transition, and the demand for more compact, more efficient, more reliable and more sustainable converters and actuators is growing at an increasing pace. Moreover, the role of electric vehicles and transportation systems in the power grid transition towards a larger role of renewable energy sources is of the foremost importance. This PhD research project relates to finding new disruptive solutions for advanced power conversion in the mentioned industries, taking full advantage of enabling technologies such as wide bandgap power semiconductors, rare-earth free permanent magnets of new generation, unprecedented computational capability for off-line multi-physical modeling and for real-time simulation and control of the power conversion devices and power systems. The goals of the PhD research project cover innovative design, modeling, simulation and test methodologies for power converters and actuators, targeting the power density, reliability, sustainability and electro-magnetic compatibility requirements of the next generation of power converters and actuators for transportation electrification and the new challenges of power systems and

the electric grid under massive volumes of electric vehicles.

**Skills and
competencies
for the
development of
the activity**

Solid power conversion background

Knowledge of heat transfer and structural mechanics

Design, simulation and test of power converters and actuators

Simulation of power grids

Coding skills

Real-time simulation, finite element analysis