ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

TEXA S.p.A. - Design and Analysis of Interior Axial Flux PM Machines for Traction Applications

Funded By	TEXA S.P.A. [P.iva/CF:02413550266]
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Context of the research activity	Design and Analysis of High-Performance Interior PM Axial Flux Machines for Electric Vehicle Applications.
Objectives	The development of compact, high-performance electric machines is a strategic enabler for the electrification of next-generation vehicles, where space constraints, high power density, and system integration play a critical role. In this context, axial flux machines are gaining increasing attention in the automotive sector due to their compact architecture, high torque density, and potential for efficient integration into electric powertrains. The research activities will focus on the design and modelling of axial flux electric machines, with particular emphasis on interior permanent magnet (IPM) topologies. The PhD candidate will be engaged in the development of numerical and analytical simulation models and analysis tools for axial flux interior permanent magnet machines (AFIPM), as well as in the design of a dedicated AFIPM machine solution for automotive traction applications. The research activity will also require identifying for the designed machine the key parameters suitable for the development of control strategies, with the aim of ensuring optimal exploitation of the designed motor's capabilities. Validation of the developed models and the designed machine will be conducted comparing the simulation results with those obtained by experimental measurements.
Skills and competencies for the development of	The PhD candidate is required to have a solid background in electromagnetic principles governing electric machine operation and energy conversion. A good understanding of electric machine design, with reference to permanent magnet topologies and thermal/mechanical aspects, is considered an asset. Experience in modelling and simulation tools for electromechanical systems (e.g. FEM, multiphysics environments) is highly desirable.

development of the activity	Furthermore, the candidate should be capable of addressing scientific and technological challenges in a multidisciplinary context applying rigorous and methodical scientific approaches, especially in the development of advanced solutions for automotive electric propulsion systems.