

# PhD in Mechanical Engineering

## Research Title: Design of mechatronic systems for fuel cells system integration for automotive applications

<b>Funded by</b>	Dayco Europe S.r.l.
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<b>Context of the research activity</b>	<p>The increasing concerns about global warming justifies the enforcement of progressively more stringent regulations to limit the greenhouse emissions from the transport system. In order to comply to the new regulations the automotive sector is adopting an increased level of powertrain electrification. Market analyses show that in the next 10 years, vehicles powered by just the internal combustion engine will be less than 40%, while the rest will include various forms of hybrids (40%) and purely electric (20%).</p> <p>In this context Fuel Cells systems are considered as a viable solution by several authorities such as the EU, and other Governmental agencies in different Countries.</p> <p>Dayco Europe is a global Company producing systems and components for electrified powertrains. Dayco Europe is interested in investigating the potentialities of Fuel Cells systems in automotive and commercial vehicles applications. The research will then be carried on in the framework of a cooperation between Dayco Europe, the interdepartmental centers of Politecnico di Torino active in the fields of automotive and fuel cells system, such as the Center for Automotive Research and Sustainable Mobility and the EC-Lab of the Energy Center.</p>
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<b>Objectives</b>	<p>The present research has the goal of investigating the potentialities of Fuel Cells systems in automotive and commercial vehicles applications. In order to achieve this goal the activity will include the following phases</p> <ol style="list-style-type: none"><li>1) State of the art analysis on fuel cells systems for automotive applications and energy flow management.</li><li>2) Fuel cells system modelling and its integration in the vehicle model for consumption prediction. Experimental validation at subsystem and system level.</li><li>3) Analysis of the fuel cells system components such as air-pump.</li><li>4) Study of energy management strategies for fuel consumption minimization. Analysis of the role of the battery.</li></ol>
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<b>Skills and competencies for the development of the activity</b>	<p>The candidate should have an automotive, mechanical or a mechatronic engineering background with strong interest in multi-disciplinary research in cooperation with an industrial partner. The activity will also deal with the experimental validation of the modelling approaches, therefore the candidate should have a prominent attitude to experimental activity as well as to the design of prototypes and demonstrators.</p>
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