



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

**PNRR 117 Research Field: IMPROVING VEHICLES PERFORMANCE BY SENSING FORCES
AND MOMENTS**

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

With reference to the D.M. 117 (2-3-2023), the PhD researcher objectives will address Missions 1 and 4 of the National Plan for Recovery and Resilience - PNRR (Piano Nazionale Ripresa e Resilienza).

Mission 1 of PNRR focuses on digital transition, competitiveness of productive chains. The PhD researcher will aim at developing digital twins to evaluate the active safety performance of high-performance road vehicles. New systems based on tyre force and moment measurement will allow to reduce the stopping distance and improve the active safety of vehicles.

Mission 4 of PNRR focuses on filling the gap of education and fostering technology transfer. The PhD researcher will aim to become expert in the field of vehicles active safety systems and become team leader thanks to acquired soft skills during secondments at company sites.

Methods and techniques that will be developed and used to carry out the research

Improving the active safety of vehicles by the real time measurement of forces and moments will be the main focus of the research activity. The active safety of road vehicles is related to longitudinal, lateral and vertical motions. Real time models will be developed in order to simulate and safely drive (@ driving simulator) digital twins of vehicles equipped with new safety systems. A considerable improvement of the vehicle active safety is expected by sensing the forces at the wheels. Prototypes



	expected by sensing the forces at the wheels. Prototypes of the six-axis measuring hubs will be manufactured and tested. The Ph.D. candidate will study advanced computational mechanics techniques spanning from FEM to MBD. Different levels of virtualization for vehicle, sensors, actuators and environment will be implemented. He/She will learn how to test vehicles subsystems in a series of environments, starting from simulation and ending with physical, full-scale tests reducing the time and cost of outdoor tests from the initial stages of the development process.
Educational objectives	<i>Hard skills:</i> computational mechanics, experimental mechanics <i>Soft skills:</i> team leadership, problem solving, dissemination, communication and outreach activities, networking, research fund procurement and management.
Job opportunities	Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field.
Composition of the research group	2 Full Professors 2 Associated Professors 1 Assistant Professors 5 PhD Students
Name of the research directors	Prof. Massimiliano Gobbi, Prof. Gianpiero Mastinu

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad



Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Brembo S.p.A.
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Advanced Electromagnetics B.V. (The Netherlands)
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707, 13. Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.