POLITECNICO DI MILANO

PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 40th cycle

THEMATIC Research Field: DEVELOPMENT OF COOPERATIVE ADAS BASED ON DYNAMIC DRIVING SIMULATOR TESTS

Monthly net income of PhDscholarship (max 36 months)
€ 1500.0 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	Driving simulators are extensively used by car manufacturers and OEMs to develop products while reducing the costs and risks associated with outdoor tests. The DriSMi Lab of Politecnico di Milano (https://www.drismi.polimi.it/) hosts an innovative dynamic driving simulator, where the cockpit of a commercial car moves throughout a 6x6-meter platform thanks to a system of cables and electric actuators. The dimensions of the simulator allow to reproduce maneuvers like lane-change in 1:1 scale. Through its innovative features, the simulator provides an immersive and realistic test environment that can be safely experienced also by non-professional drivers. This last opportunity appears nowadays of particular interest as new ADAS (Advanced Driver-Assistance Systems) systems or control logics for CCAM (Cooperative, connected and automated mobility) vehicles can be developed also considering the feedback from common users. The final costumer can thus influence the development of such systems so that they can be tailored on specific profiles to improve their acceptance.
Methods and techniques that will be developed and used to carry out the research	The dynamic simulator is a sophisticated system resulting from the integration of mechanics, electronics, control systems, computer vision and real-time applications. It is essential to develop interdisciplinary skills that include multi-body system dynamics, non-linear systems, control systems, real-time applications, vehicle dynamics, tire-

	systems, real-time applications, vehicle dynamics, tire-road interaction models, powertrain and brake system models, vibration control, acoustics.
Educational objectives	The challenges that the candidate will have to face are both theoretical and experimental: •develop hi-fi models for components like tires (including surface temperature effect, interaction with wet surfaces), suspensions, engine/powertrain, brakes, actuators, sensors like lidars, cameras; •develop innovative ADAS possibly based on a sensor-fusion approach that are able to exploit V2X communication. •develop control algorithms for automated driving possibly based on a sensor-fusion approach that are able to exploit V2X communication •objectively evaluate drivers' reactions and upgrade/tailor the settings of the control systems accordingly
Job opportunities	Being the research carried out with the state-of-the-art of driving dynamic simulators, the primary job opportunity will be in the automotive field. Automobile industries and companies providing components (brake systems, suspensions, powertrain).Besides this, job opportunities will be with national and international academic and non-academic institutions and organizations, engaged in innovation, research and technical development. Our last survey on MeccPhD Doctorates highlighteda 100% employment rate within the first year and a 35%higher salary, compared Master of Science holders in thesame field.
Composition of the research group	1 Full Professors 1 Associated Professors 2 Assistant Professors 2 PhD Students
Name of the research directors	Proff. Edoardo Sabbioni, Stefano Melzi

Contacts
Email: edoardo.sabbioni@polimi.it , stefano.melzi@polimi.it For questions about scholarship/support phd-dmec@polimi.it

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	750.0 €
By number of months	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 6.114,50.
Our candidates are strongly encouraged to spend a research period abroad, joining high-level research groups in the specific PhD research topic, selected in agreement with the Supervisor. An increase in the scholarship will be applied for periods up to 6 months (approx. 750 euro/month- net amount).
Teaching assistantship: availability of funding in recognition of supporting teaching activitiesby 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.