



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 40th cycle

**THEMATIC Research Field: DEVELOPMENT AND QUALIFICATION OF ADVANCED MEASUREMENT SYSTEMS**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1500.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<b>Motivation and objectives of the research in this field</b>	<p>Nowadays the role of measurements is no longer limited to the estimation of physical quantities, but it also involves the smart processing of huge amounts of data in real time, to enable a full interaction with the surrounding environment and support the decision makers. Production line monitoring is quickly evolving, thanks to the possibility to share the data in real time in the cloud and to the availability of efficient processing approaches for big data manipulation. Industrial sensing benefits from the huge innovations in space research and consumer electronics, that continuously push for a strong development of sensors. In these scenarios, the availability of reliable and accurate data plays a crucial role. This project is aimed at the development and metrological qualification of measuring solutions for networked sensors and big data manipulation, for industrial and scientific applications. The main goals of the research include the optimization of the measuring approaches and data analysis to obtain a reliable representation of the monitored system or process. The joint analysis and optimization of the data acquisition and data processing for a network measurement will be a key point of the research.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>Development of new sensing solutions based on modern low-cost and low-power hardware, to obtain efficient and reliable measuring nodes. Development of data processing strategies to obtain information on the</p>



	processing strategies to obtain information on the monitored system by synergic analysis of data from a number of sensors.
<b>Educational objectives</b>	We provide doctoral candidates with high-level scientific training, fostering and refining research and problem solving abilities by focusing on both theoretical and experimental skills. A PhD in Mechanical Engineering will be able to layout, draft and carry on original research, by leading a research group or working in a team.
<b>Job opportunities</b>	Employment statistics of PhDs can be found <a href="https://cm.careerservice.polimi.it/en/employment-statistics/">https://cm.careerservice.polimi.it/en/employment-statistics/</a>
<b>Composition of the research group</b>	3 Full Professors 5 Associated Professors 2 Assistant Professors 10 PhD Students
<b>Name of the research directors</b>	Proff. M. Tarabini, P. Chiariotti, S. Manzoni

<b>Contacts</b>	
<p>Phone 02 2399 8808 Email <a href="mailto:marco.tarabini@polimi.it">marco.tarabini@polimi.it</a>                      For further information/support, please contact <a href="mailto:phd-dmec@polimi.it">phd-dmec@polimi.it</a></p>	

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

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	750.0 €
<b>By number of months</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>
<p>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.</p> <p>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</p>



euro/month- net amount).

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.



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 40th cycle

**THEMATIC Research Field: DEVELOPMENT AND CHARACTERIZATION OF INSTRUMENTS  
FOR SPACE EXPLORATION**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1500.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<b>Motivation and objectives of the research in this field</b>	<p>The design of instruments for space exploration is experiencing epochal changes because of the challenges due to the introduction of additive manufacturing processes and the massive usage of data processing techniques. Design phases traditionally driven by designer's experience such as optomechanical structures optimization and numerical models validation, can potentially become automatic processes leveraging on the emerging data processing technologies.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>The research will focus on the design of optomechanical structures and thermal models' validation. Both processes are commonly based on experienced designers who translate the problems on parametric analysis that through a minimization process provide the optimal parameter set. Starting from this approach the feasibility and advantages of automatic systems will be investigated. The study will be applied to systems and test data available from instruments recently developed or currently under design in the laboratory.</p>
<b>Educational objectives</b>	<p>The candidate will eventually fully master the modelling tools and methods required for the analysis of the measuring systems. Applications to space and industrial environments will be considered. The capability of designing test set-ups and test procedures, developing data processing techniques for measurement validation</p>



	and uncertainty reduction will be among the developed skills
<b>Job opportunities</b>	Employment statistics of PhDs can be found <a href="https://cm.careerservice.polimi.it/en/employment-statistics/">https://cm.careerservice.polimi.it/en/employment-statistics/</a> List of Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research include: INAF (National Institute of Astrophysics), CNR (Italian National Research Council), UNIPD (University of Padua), ASI (Italian Space Agency), ESA (European Space Agency)
<b>Composition of the research group</b>	1 Full Professors 1 Associated Professors 1 Assistant Professors 4 PhD Students
<b>Name of the research directors</b>	Prof. Diego Scaccabarozzi

#### Contacts

*Phone* +39 0223998226 *Email* [diego.scaccabarozzi@polimi.it](mailto:diego.scaccabarozzi@polimi.it)  
For questions about scholarship/support: [phd-dmec@polimi.it](mailto:phd-dmec@polimi.it)

#### Additional support - Financial aid per PhD student per year (gross amount)

<b>Housing - Foreign Students</b>	--
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