



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 38th cycle

Research Area n. 2 - Electronics

**THEMATIC Research Field: DEVELOPMENT OF INNOVATIVE HIGH-PERFORMANCE MEMS
ACTUATORS AND ELECTRONICS**

Monthly net income of PhDscholarship (max 36 months)	
<p align="center">€ 1400.0</p> <p>In case of a change of the welfare rates or of changes of the scholarship minimum amount from the Ministry of University and Research, during the three-year period, the amount could be modified.</p>	
Context of the research activity	
Motivation and objectives of the research in this field	MEMS actuators are becoming pervasive in the consumer and automotive field, with the boom of micromirrors and speakers. For some specific applications, however, their performances are still behind the target specifications. For this reason, the development of next-generation MEMS actuators and associated electronics cannot be postponed any longer. Solutions based on alternative sensing technologies (PZT, capacitive, PZR), on alternative circuits (charge recovery, ecc...) or on alternative control methods (Kalman filters...) will be explored towards this goal.
Methods and techniques that will be developed and used to carry out the research	On one side, innovative working principles will be exploited to enhance actuators stability under various environmental conditions, especially temperature and pressure. On the other side, innovative electronic blocks will also be considered building up on previous research carried on with the company financing this PhD (ST Microelectronics).
Educational objectives	The educational goal is to form a PhD with capabilities of system-level approach to the design of MEMS actuating systems, and more in general of architectures where an actuator is coupled to control and readout circuits. The PhD should be capable, at the end of the research, to



	manage the design phase from specs and technological constraints to the final design.
Job opportunities	Given the more and more relevant impact of miniaturized sensors and actuators in our everyday life (IoT, autonomous driving, smart cities/factories/ health), the job opportunities after the PhD include industrial R&D positions, similar positions in research centres, and the academic career (RTD-A). All these positions can be offered by Italian or foreign companies or institutions.
Composition of the research group	0 Full Professors 1 Associated Professors 0 Assistant Professors 4 PhD Students
Name of the research directors	Giacomo Langfelder

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)			
	1st year	2nd year	3rd year
Housing - Foreign Students	1500.0 € per student	1000.0 € per student	1000.0 € per student
	max number of financial aid available: 2, given in order of merit ..		
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

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: Politecnico di Milano; ST Microelectronics</p> <p>The research will be carried out in the laboratory of MEMS and Microsensors of DEIB/Politecnico di Milano. The laboratory is equipped with up-to-date software and instrumentation for the design of MEMS systems, related electronic circuits, and for their characterization. The activity will be</p>



reported to the supporting company through continuous updates in the form of e.g. PowerPoint presentations, Word and .pdf documents and meetings to discuss the research development.

EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student

5.707,13 Euro per student

TEACHING ASSISTANTSHIP: (availability of funding in recognition of supporting teaching activities by the PhD student)

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.

COMPUTER AVAILABILITY:

1st year: individual use

2nd year: individual use

3rd year: individual use

DESK AVAILABILITY:

1st year: individual use

2nd year: individual use

3rd year: individual use