



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

Research Area n. 3 - Systems and Control

**INTERDISCIPLINARY Research Field: UNDERSTANDING OF COGNITIVE INFLUENCE ON
HUMAN-MACHINE INTERACTIONS**

Monthly net income of PhDscholarship (max 36 months)

€ 1250.0

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

Interdisciplinary PhD Grant

The PhD research will be carried out in collaboration with research groups of the PhD programme in "**AEROSPACE ENGINEERING**".

See <https://www.dottorato.polimi.it/?id=422&L=1> for further information.

Human-machine interaction has long been a subject of great interest, both in research and in the industry, in domains ranging from collaborative robotics to transportation systems and design of interfaces. As highly automated transport systems become more widespread, understanding the effects of this interaction is becoming more complex, due to the increase in number and complexity of the interacting elements: the human, the dynamics of the transport system, and the control systems. The objective of this Ph.D. will be to investigate the modelling aspects of human behavior in the interaction with the physical system, using human-machine models targeted at different representation levels: from variations of muscular tone caused by changing state of stress, to psychophysical and cognitive models that are useful, for instance, to define descriptive and predictive models of a pilot decision process. The research will deal with both the definition of the



	mathematical models, and the implementation of experimental setups to identify and validate the models.
Methods and techniques that will be developed and used to carry out the research	We will use mathematical models in the form of differential and difference equations, discrete event systems, and formal models. The employed methodologies will come from the fields of automation, and control theory, virtual and augmented reality, and vehicular simulation.
Educational objectives	The Ph.D. candidate will learn skills in the fields of control theory and mathematical modelling of transport systems, virtual reality and human-machine interface evaluation and design.
Job opportunities	Academia, international institutions, automotive and aviation industry.
Composition of the research group	1 Full Professors 2 Associated Professors 0 Assistant Professors 2 PhD Students
Name of the research directors	A. Colombo, F. Ferrise, G. Quaranta

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	625.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Candidates with a background in mathematical modelling (of mechanical, aerospace, transportation, biomechanical systems) and control theory are encouraged to apply.



LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: 1. Netherlands Aerospace Centre (www.nlr.org); 2. Zenseact (www.zenseact.com); 3. University of Nottingham

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

5.095,96 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