



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

Research Area n. 3 - Systems and Control

THEMATIC Research Field: HUMAN SURROGATE ROBOTIC CELL (HSRC 4.0)

Monthly net income of PhDscholarship (max 36 months)	
€ 1325.0	
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.	
Context of the research activity	
Motivation and objectives of the research in this field	<p>The aim of this research is to exploit the human's intelligence and the robot's speed and repeatability in order to have a fast robotic cell with human control. Every module, such as the control logic and assembling strategy, will be chosen to have an agile and lean production system that can respond to the ever-changing manufacturing requirements of a high-mix low-volume production assembly, and be appropriate for the tough competitive nature of manufacturing industries. The idea is to develop a tele-operated system, where the tele-operation is assisted. The tele-operated robotic cell will feature a human-in-the-loop, working in a master (human) - slave (robot) paradigm. This means that the robot will control some aspects of the task, such as the grip and orientation, while the trajectory, for example, will be controlled by the human. Another difference with the current tele-operation approaches is that there will be no feedback from the robot to the operator. That permits faster communication, as the system only requires to send command input from the human, and not vice versa.</p>
Methods and techniques that will be developed and used to carry out the research	<p>The research will make use of the typical methods and techniques involved in a robotics project, such as modelling mechanical systems, control, vision, sensor fusion, task programming and sequencing.</p>



Educational objectives	The candidate will master techniques for the cognitive collaboration between human and robot, which is expected to be a very important ingredient of the factory of the future.
Job opportunities	The job market for experts in the field of robotics, and specifically of collaborative robotics, is already large today and is expected to become even more interesting in the coming years. Opportunities to work in the research institutes will also be available.
Composition of the research group	1 Full Professors 1 Associated Professors 0 Assistant Professors 4 PhD Students
Name of the research directors	Paolo Rocco, Andrea Maria Zanchettin

Contacts	
<p>Prof. Paolo Rocco paolo.rocco@polimi.it +39 02 2399 3685 https://rocco.faculty.polimi.it/</p> <p>Prof. Andrea Maria Zanchettin andreamaria.zanchettin@polimi.it +39 02 2399 4025 https://zanchettin.faculty.polimi.it/</p>	

Additional support - Financial aid per PhD student per year (gross amount)			
Housing - Foreign Students	1st year	2nd year	3rd year
	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	662.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL



INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: 1. Italian Institute of Technology (IIT); 2. Camozzi Group

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

5.401,42 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