



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

Research Area n. 3 - Systems and Control

**PARTENARIATO PNRR Research Field: AI-ENHANCED ENGINEERING TOOLS FOR
OPTIMAL DEPLOYMENT OF COLLABORATIVE ROBOTICS APPLICATIONS**

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

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**

This research project is in the framework of
MICS (3A-ITALY)
PARTENARIATO ESTESO MADE IN ITALY CIRCOLARE
E SOSTENIBILE
CUP D43C22003120001
Decreto di Concessione D.D. 1551 del 11/10/2022

The PhD scholarship proposal is in the context of
collaborative robotics, that is the newest version of
industrial robotics designed for the close and safe
interaction between human operators and robotic
manipulators. The research aims at using artificial
intelligence to improve the design and deployment phase
of collaborative robotics applications.

**Methods and techniques that will be
developed and used to carry out the
research**

Collaborative robotics primarily aims to allow the use of
industrial robotic manipulators in the presence of humans
in safe conditions, guaranteed by the mechanical design
and the control system of the robot itself. Among the
various possible applications of collaborative robotics, the
assembly of mechanical parts is of particular
importance. Such applications have to be accurately
designed and engineered in order to take optimal
advantages from both the human and the robot. Part
presentation, robot placement, robot movements, human



	and robot tasks represent typical decision variables. On the other hand, human safety and ergonomics and cycle times are typical KPIs. The design task of application engineers may be assisted by edge/cloud automated algorithms (capable of performing several what-if analyses in background) suggesting the engineering team suitable modifications of the layout/application for a more productive application.
Educational objectives	The candidate will master AI techniques for the design and the development of optimized collaborative robotics applications, 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 2 Assistant Professors 8 PhD Students
Name of the research directors	Andrea Maria Zanchettin

Contacts
andreamaria.zanchettin@polimi.it 0223994025

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	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
The research proposal will be carried out at the Merlin Lab, within the Electronics, Information and



Bioengineering Department (@PoliMI). According to the rules of the PhD Programme in Information Engineering at Politecnico di Milano, the candidate will be required to attend at least five 5 credits courses to complement her/his background. Moreover, the candidate may also be required to supervise MS students developing their thesis and perform TA-ing duties within curricular courses at Politecnico di Milano.

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

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: individual use

DESK AVAILABILITY: individual use

D.D. 341 del 15/03/2022 Avviso pubblico per la presentazione di Proposte di intervento per la creazione di "Partenariati estesi alle università, ai centri di ricerca, alle aziende per il finanziamento di progetti di ricerca di base" – nell'ambito del Piano Nazionale di Ripresa e Resilienza, Missione 4 "Istruzione e ricerca" – Componente 2 "Dalla ricerca all'impresa" – Investimento 1.3, finanziato dall'Unione europea – NextGenerationEU