POLITECNICO DI MILANO

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

Research Area n. 1 - Computer Science and Engineering

PNRR_352 Research Field: REINFORCEMENT LEARNING FOR INDUSTRIAL PLANT CONTROL

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	A gas turbine is used to power various things including aircraft; trains; ships; pumps; gas compressors; tanks; and electrical generators to power e.g. homes. Managing such a complex system is a challenging task where artificial intelligence techniques can play a central role. The goal of this research is to produce robust and flexible control strategies that can allow improving the efficiency and safety of gas turbines under various operating conditions.
Methods and techniques that will be developed and used to carry out the research	During the research, the PhD student will study the basics of machine learning and will deepen the knowledge of reinforcement learning approaches, with particular attention to methodologies aimed at solving the modeling and the control of gas turbines.
Educational objectives	During the research, the candidate will develop skills to explore the state of the art and identify which topics still need to be covered and can be advanced by the research project. Furthermore, the PhD student will learn to communicate the achieved research results both orally and through publications.
Job opportunities	Nowadays, completing a PhD in the machine learning field gives unique job opportunities. Recent PhD

	graduates have found employment as post-doc in the most prestigious universities and recent centers in Europe or have become researchers in one of the top tech companies.
Composition of the research group	4 Full Professors 4 Associated Professors 9 Assistant Professors 25 PhD Students
Name of the research directors	Prof. Marcello Restelli

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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	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Nuovo Pignone Tecnologie s.r.l. (https://www.bakerhughes.com/baker-hughes-italia)
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	TU Darmstadt Intelligent Autonomous Systems: Machine Learning for Intelligent Autonomous Robots (https://www.ias.informatik.tu-darmstadt.de/)
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Attinenza alla tematiche, alle missioni/componenti prescelte del bando PNRR v. D.M. 352, art.6

La segeunte proposta di dottorato è attinente alle seguenti tematiche:
M1C2 - Digitalizzazione, innovazione e competitività nel sistema produttivo
M2C3 - Efficienza energetica e riqualificazione degli edifici

Impresa, presso cui si svolgerà l'attività esterna

Nuovo Pignone Tecnologie s.r.l.
Industria 4.0
https://www.bakerhughes.com/baker-hughes-italia
6 mesi
Il periodo di stage sarà l'occasione per il dottorando di eseguire test sul campo delle tecniche che avrà sviluppato nei primi due anni di dottorato.
Stiamo terminando una collaborazione di 6 mesi per lo sviluppo di un algoritmo di reinforcement learning per il controllo della valvola anti-pompaggio.

Ente, università, azienda, centro di ricerca presso cui si svolgerà il periodo di studio e ricerca all'estero

TU Darmstadt
Intelligent Autonomous Systems: Machine Learning for Intelligent Autonomous Robots
https://www.ias.informatik.tu-darmstadt.de/
6 mesi
Durante il periodo di permanenza all'estero, il dottorando avrà l'opportunità di applicare le tecniche sviluppate durante il suo dottorato su problemi robotici all'interno di un centro di ricerca che rappresenta un'eccellenza a livello mondiale.
Il laboratorio del prof. Jan Peters, ha ospitato e ospita numerosi tesisti, dottorandi e post-doc che provengono dal nostro laboratorio e con cui abbiamo collaborazioni di ricerca di lunga data.

All information regarding educational activities, personal funding, regulations and obligations of Ph.D. candidates are available on the web site https://dottoratoit.deib.polimi.it/