POLITECNICO DI MILANO

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

Research Area n. 4 - Telecommunications

PARTENARIATO PNRR Research Field: EDGE-NETWORKING AND COMPUTING INFRASTRUCTURE FOR AI-BASED 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 RESTART PARTENARIATO ESTESO RESEARCH AND INNOVATION ON FUTURE TELECOMUNICATION SYSTEMS AND NETWORKS TO MAKE ITALY MORE SMART CUP D43C22003080001 Decreto di Concessione D.D. 1549 del 11/10/2022 Modern applications that make extensive use of AI and ML require the support of an agile network environment that allows for continuous collection and processing of raw data at the edge, while processing functions and trained models can be efficiently migrated from one site to another on the network.The objective of this research is to study the control and orchestration of an advanced edge-computing architecture distributed on several geographically-distant sites supporting AI-based applications, such as image recognition for environmental surveillance or other IoT-related applications.More specifically, the proposed research activity will have the objectives of developing algorithms and techniques to control and orchestrate the cloud continuum from UAV-mounted smart sensors (capable of extreme-edge ML functions), to local-area edge networks (e.g. FANET), to

	the SD-WAN based interconnections. The research will be finalized to the projects WatchEDGE within the framework of RESTART.
Methods and techniques that will be developed and used to carry out the research	Methodologies to develop the research objectives will come from the fields of: machine learning (convolutional deep learning, federated learning, reinforcement learning), network softwarization and automation, network function virtualization.
Educational objectives	The PhD student will learn how to design and develop a network that supports AI-based applications, how to implement and deploy the algorithms into a control and orchestration system, and how to test performance by using simulation, lab testing and possibly field trials.She/he will also learn how to setup, maintain and manage an experimental edge-computing infrastructure.
Job opportunities	There is a very strong request of PhD students with a specific background knowledge in the field of edge computing, IoT and machine learning. Recently, some of our former PhD students have been hired in top high-tech companies as Google, Nokia or Facebook.
Composition of the research group	1 Full Professors 4 Associated Professors 2 Assistant Professors 4 PhD Students
Name of the research directors	Guido Maier, Sebastian Troìa

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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--

POLITECNICO DI MILANO

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
LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: Politecnico di Milano; Università di Catania; CNIT-RASS Pisa; Italtel 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