POLITECNICO DI MILANO

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

Research Area n. 4 - Telecommunications

PARTENARIATO PNRR Research Field: NEW TECHNOLOGIES FOR INTELLIGENT SPATIAL AUDIO

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 ECS-MUSA ECOSISTEMA DELL'INNOVAZIONE MUSA - MULTILAYERED URBAN SUSTAINABILITY ACTION CUP D43C22001410007 Decreto di Concessione D.D. 1055 del 23/06/2022 Spatial audio will undergo a dramatic revolution in the next few years, due to the ever-increasing availability of low-cost acoustic sensors and emitters. There is therefore the need of developing distributed networks of acoustic transducers for a wide range of applications and services for the citizens. This requires novel representations of sound fields that are suitable for an efficient processing of large amounts of data. The focus will be on developing advanced applications for intelligent acoustic sensing and rendering for services aimed at security and inclusion.
Methods and techniques that will be developed and used to carry out the research	The methodologies that will be developed will be based on space-time audio processing techniques (source localization, separation and characterization, selective spatial audio rendering) combined with machine intelligence.
Educational objectives	The doctoral program will be aimed at developing

	expertise in space-time audio processing, with special emphasis on development the of algorithms for distributed networks of acoustic transducers, based on data-driven algorithms of machine intelligence.
Job opportunities	Experts in intelligent space-time audio processing are highly sought after by industries that develop professional or consumer devices based on multiple loudspeakers and/or microphones, and by companies that develop PA systems and are interested in selective audio rendering.
Composition of the research group	2 Full Professors 1 Associated Professors 3 Assistant Professors 9 PhD Students
Name of the research directors	Augusto Sarti, Fabio Antonacci

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

The activity pursued by the PhD student is related to the project **MU**ltilayerd **S**ustainability **A**ction (MUSA), aimed at developing technologies for the digital transition of the territory. In particular, the activities are framed within the Spoke 3 of the MUSA project, which is called "Deep tech: Entrepreneurship and technology Transfer", for the strengthening of the entrepeneurship based on research and technological innovation and for the development of innovative services for companies working in the territory. The participants to the Spoke 3 of the MUSA project are: Politecnico di Milano, Fondazione Politecnico di Milano, Università degli Studi di Milano Bicocca, Università Bocconi and several other companies located in the Milan area interested in the digital transition, for both the development of technology and its use. Within the research project, the PhD student is expected to investigate on the use of sensors and transducers based on

innovative technologies (e.g. MEMS) that are suited with the research aims for their reduced costs and power consumptions. More specifically, investigations will be carried out on: 1) audio-surveillance systems, with particular reference to source localization, extraction and identification; 2) rendering of audio content in prescribed regions of the environment, while preserving their spatial features.

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

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. 3277 del 30/12/2022 Avviso pubblico per la presentazione di Proposte di intervento per la creazione di 12 Ecosistemi dell'innovazione sul territorio nazionale da finanziare nell'ambito del Piano Nazionale di Ripresa e Resilienza, Missione 4 Componente 2 Investimento 1.5 - Creazione e rafforzamento di "ecosistemi dell'innovazione", costruzione di "leader territoriali di R&S" - finanziato dall'Unione europea - NextGenerationEU.