



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

Research Area n. 4 - Telecommunications

PNRR_352 Research Field: DIFFERENTIAL LOUDSPEAKER MEMS ARRAYS

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	MEMS Loudspeakers are the next frontier of MEMS transducers. The interest in such devices is for their low size and cost. This potentially enables the design of clusters of loudspeakers that are much closer to each other than the wavelengths of interest, thus paving the way to differential arrays of loudspeakers, which are not possible in the electrodynamic world. Many are the challenges to face: design of matched devices, design of compact clusters of devices, linearization of their behavior, etc. This PhD will focus on such challenges.
Methods and techniques that will be developed and used to carry out the research	Differential Loudspeaker Array arrangements of various order, inspired by Differential Microphone Arrays (DMAs). Dealing with imperfect device matching. Looking into the possibility of multi-channel compensation of non idealities.
Educational objectives	Development of expertise in frequency-independent space-time processing based on differential configurations of transducers. Expertise in the design of MEMS devices. Expertise in multi-physics simulation.
Job opportunities	Such professional figures are highly sought-after by the industry of semi-conductors, but also by companies focusing on computational acoustics in general
Composition of the research group	2 Full Professors



	1 Associated Professors 7 Assistant Professors 8 PhD Students
Name of the research directors	Prof. Augusto Sarti / Silvia Adorno

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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)	STMicroelectronics (ST) Analog, MEMS & Sensor Group https://www.st.com/en/mems-and-sensors.html
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	LAUM (Laboratoire d'Acoustique de l'Université du Mans) - LE MANS - FRANCE
By number of months abroad	6

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

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

Le attività di ricerca previste sono allineate alla Missione 1: "Digitalizzazione, innovazione, competitività, cultura e turismo", con particolare riferimento alla componente M1C2: "Digitalizzazione, innovazione e competitività nel sistema produttivo" del Piano Nazionale di Ripresa e Resilienza (PNRR). In questo ambito la Transizione 4.0 mira a fornire nuovo impulso alla transizione digitale delle imprese e al tasso d'innovazione del tessuto industriale e imprenditoriale del Paese. Le tecnologie MEMS array su cui si concentra l'attività prevista sono critiche per la diffusione di interfacce acustiche personalizzate per applicazioni in ambito automotive, e entertainment. La proposta è inoltre allineata agli obiettivi M4C2 "dalla ricerca all'impresa" in quanto promuove una stretta interazione fra università e imprese nonché innovazione di processo per lo sviluppo di alta tecnologia, potenziando nel contempo le competenze in ambiti di interesse per l'industria.



Impresa, presso cui si svolgerà l'attività esterna

STMicroelectronics

Electronica, MEMS

https://www.st.com/content/st_com/en.html

6 mesi

Design e caratterizzazione dispositivi TMOS

Attività in corso nell'ambito del JRC STEAM

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

STMicroelectronics, Grenoble, France

Electronics, Photonics, MEMS

https://www.st.com/content/st_com/en.html

6 mesi

Silicon Photonics

Collaborazioni spontanee e in ambito di progetti EU su tematiche di silicon photonics

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/>