



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

Research Area n. 4 - Telecommunications

**PARTENARIATO PNRR Research Field: SENSING AND PROCESSING OVER V2X
NETWORKS FOR SUSTAINABLE URBAN MOBILITY**

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
CN-MS
CENTRO NAZIONALE DELLA MOBILITA' SOSTENIBILE
CUP D43C22001180001
Decreto di Concessione D.D. 1033 del 17/06/2022

The research focuses on the design and assessment of V2X communication/processing systems to be employed in a smart urban road, both at the infrastructure and the vehicles, for enabling cooperative ITS services for road safety and traffic efficiency, such as:

- Extended sensing of the road environment based on data fusion and cooperative processing at different road stations/users, e.g. for vulnerable road user (VRU) protection;
- Smart intersection systems based on V2X communications, sensors for detection of vehicles and near-miss accidents, as well as traffic signal synchronization, to support traffic-management.

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

The PhD candidate will develop methods to be used by the smart road platform and the vehicles, relying on 5G-



	advanced communications for low-latency ultra-reliable exchange of massive sensor data (e.g., imaging sensor streams). Cooperative processing algorithms will be designed to provide an augmented sensing of the road environment exploiting the positioning capabilities of 5G signals, along with direct V2X interaction and distributed sensing at road users/stations (e.g., GPS-RTK, IMU, lidar, radar and cameras), resorting also to federated learning techniques for data fusion.
Educational objectives	The PhD candidate will develop a strong background in communication and signal processing for smart mobility, together with practical engineering skills thanks to the strict collaboration with the IoT Lab team and the CNMS mobility. Furthermore, the doctoral program offers advanced training in the hot topics currently explored by the scientific community and industry.
Job opportunities	Careers are envisioned in any of the leading companies of the information technology industry, or in the technological branch of main companies of the transport area, such as road operators, car suppliers, car makers and data services providers. Post doc positions are also frequently offered in the academia. Since the research is part of the PNRR CNMS project, the PhD student will have the chance to interact and cooperate with the partners of the CNMS consortium, which includes leading industrial and academic players of the mobility sector in Italy.
Composition of the research group	0 Full Professors 1 Associated Professors 1 Assistant Professors 5 PhD Students
Name of the research directors	Monica Barbara Nicoli

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	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>The research is carried out in the framework of the spoke Urban Mobility of the PNRR project Centro per la Mobilità Sostenibile (CNMS), National Centre for Sustainable Mobility, in cooperation with the partners of the consortium.</p> <p>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 per student</p> <p>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.</p> <p>COMPUTER AVAILABILITY: individual use</p> <p>DESK AVAILABILITY: individual use</p> <p>D. D. 3138 del 12/16/2021 rettificato con D.D. 3175 del 18/12/2021 "Avviso pubblico per presentazione Proposte di intervento per il Potenziamento di strutture di ricerca e creazione di "campioni nazionali" di R&S su alcune Key Enabling Technologies da finanziare nell'ambito del Piano Nazionale di Ripresa e Resilienza, Missione 4 Componente 2 Investimento 1.4 "Potenziamento strutture di ricerca e creazione di "campioni nazionali di R&S" su alcune Key Enabling Technologies" finanziato dall'Unione europea - NextGenerationEU"</p>