



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 39th cycle

Research Area n. 4 - Telecommunications

**PARTENARIATO PNRR Research Field: COMMUNICATION AND LOCALIZATION
TECHNOLOGIES FOR VEHICULAR 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**

Centro Nazionale per la Mobilità Sostenibile (CNMS) -
Spoke 6
CUP: D43C22001180001Decreto di concessione: Decreto
Direttoriale n.1033 del 17/06/2022

The research context is within the PNRR MOST Spoke 6,
and the research activities should be carried out within the
IoT Lab of Politecnico di Milano.

The focus of the research is to investigate the recently
standardized communication technologies for mobility and
their future developments. Vehicle-to-Everything (V2X)
communications are expected to be investigated from
both theoretical and practical perspectives. This implies that
the PhD candidate should analyze and simulate the
aspects of the physical and possibly networking layers of
the telecommunication protocol in computer
environments; such activity is functional for the design,
proposal and evaluation of enhanced algorithms and
strategies that overcome current standardized solutions.
At the same time, the practical aspects of this research
targets to assess with on-field tests the currently available
V2X telecommunication hardware, either off-the-shelves
or developed ad-hoc with custom development kit and
boards. As further possible activity, the PhD candidate
should be able to integrate the developed and/or tested



	<p>V2X technologies with positioning and sensing solutions. In particular, the research should aim to exploit the features of the latest communication standards for real-time accurate positioning, to enable a vehicle to localize itself and detect nearby obstacles. To this aim, the PhD candidate should either consider other localization solutions that need to be integrated with a V2X system, or directly exploit the cellular standard for both communication and localization.</p>
Methods and techniques that will be developed and used to carry out the research	<p>The research project consists in both theoretical and experimental activities for the development of communication and localization technologies in mobility environments. The techniques involve:</p> <ul style="list-style-type: none"> • study and modelling of current V2X communication and localization solutions available for mobility; • development of experimental setups and prototypes; • assessment of the performance and comparison with baseline solutions.
Educational objectives	<p>Develop competences on innovative components Multi-disciplinary competencies Methodological competences at both the theoretical and applied level Problem setting and solving capabilities Develop team-working attitude.</p>
Job opportunities	<p>Future job opportunities include:</p> <ul style="list-style-type: none"> • Mobility industry • Municipalities • Telecommunication industry • Localization systems <p>Besides this, job opportunities comprise national and international academic and non-academic institutions and organizations, engaged in innovation, research and technical development.</p>
Composition of the research group	<p>1 Full Professors 1 Associated Professors 2 Assistant Professors 6 PhD Students</p>
Name of the research directors	Mattia Brambilla, Antonio Capone, Monica Nicoli



Contacts

E-mail: mattia.brambilla@polimi.it

Additional support - Financial aid per PhD student per year (gross amount)	
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Housing - Foreign Students	--
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Housing - Out-of-town residents (more than 80Km out of Milano)	--
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Scholarship Increase for a period abroad	
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Amount monthly	700.0 €
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By number of months	6
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Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

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.

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