



Open PhD Position

Machine Learning for Semantic Mapping and Localization in Networks of Autonomous Agents

Program: PhD in Electrical, Electronic, and Information Engineering (ETIT), University of Bologna (UNIBO, Italy), <https://phd.unibo.it/etit/en>

Supervisors: Prof. Anna Guerra, Dr. Francesco Guidi

Project Context: The selected candidate will join the **ERC Starting Grant project “CUE-GO – Contextual Radio Cues for Enhancing Decision-Making in Networks of Autonomous Agents”**, which aims to develop a new methodological framework to improve decision-making in autonomous systems. The project combines high-frequency radio sensing and localization, semantic environmental mapping, and intelligent agent coordination. The goal is to enable autonomous agents (e.g., drones) to extract *contextual radio features/cues* from electromagnetic representations of their environment. These features carry semantic meaning relevant to the agents’ mission and can accelerate decision-making, enhance ambient awareness, and enable prediction of action outcomes.

Expected work: The selected candidate will work on wireless communications and sensing in networks of autonomous agents. The activities will align with the project's objectives:

- To design methods for high-resolution semantic mapping of the environment.
- To develop advanced localization and navigation algorithms that enhance situational awareness.

The algorithms will integrate signal processing and machine learning techniques.

Working Environment: The PhD will be conducted at the University of Bologna in collaboration with the CNR-IEIIT Institute.

Candidate Profile: We are looking for **motivated candidates** with the following background:

- MSc (or equivalent) in Electrical Engineering, Computer Science, Telecommunications, or related areas.
- Solid background in signal processing, wireless systems, applied mathematics, and/or machine learning.
- Proficiency in programming (e.g., Python, Matlab, C++).
- A passion for engaging in cutting-edge research and innovation.

Salary: Standard Italian PhD scholarship.

Application Window: May 30 – June 30, 2025

Application Website: <https://www.unibo.it/it/studiare/dottorati-master-specializzazioni-e-altra-formazione/dottorati/2025-2026>

Contacts: Interested candidates are welcome to contact anna.guerra3@unibo.it; francesco.guidi@cnr.it for further information.

This is a call for expressions of interest. The formal selection process will be carried out by a selection committee at the University of Bologna.