

Soggetto: proposta di tirocinio

<i>ID</i>	PTI_IT_Merlino Giovanni_21/05/2026 12.19.38
<i>Data</i>	21/05/2026 12.19.38

Supervisore del progetto

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Co-Supervisore del progetto

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Dettagli del progetto

<i>Titolo</i>	Coordination/sensory protocols and their implementation for swarm robotics and autonomous vehicular mobility
<p><i>Descrizione dettagliata:</i> The internship is situated in the context of Industrial IoT, distributed robotics, and autonomous vehicular mobility, with a focus on systems composed of multiple cooperating agents, such as mobile robots, autonomous vehicles, or simulated robotic nodes. These agents must coordinate through explicit communication, sensing, and decision-making protocols in order to share local observations, negotiate priorities, avoid collisions, and maintain coherent collective behavior under uncertainty, communication delays, or partial failures.</p> <p>Measurable objectives of the internship are:</p> <ul style="list-style-type: none">- analyzing 2–3 application scenarios involving coordination among robots or autonomous vehicles, such as swarm formation, coordinated intersection crossing, collaborative obstacle avoidance, or distributed task allocation.- defining one or more coordination/sensing protocols, specifying exchanged messages, agent roles, main states, transition conditions, and conflict-resolution policies.- implementing a simulated prototype of the selected protocol, evaluating the behavior of multiple agents in a controlled scenario.- measuring experimental metrics, such as number of avoided collisions, average task completion time, communication latency, number of exchanged messages, and robustness against message loss or node failure.- documenting the results through a technical report, state or sequence diagrams, plots of the collected metrics, and well-commented source code. <p>The tools to be used include simulation and development environments for robotic and IoT systems, such as ROS/ROS2, possibly integrated with Gazebo for physical simulation, programming languages such as Python, C++ or Rust, distributed communication mechanisms such as publish/subscribe middleware and libraries for collecting and visualizing experimental data.</p>	



Depending on laboratory availability, the work may be carried out entirely in simulation or validated on small mobile robots, microcontrollers, proximity sensors, wireless modules, or IoT platforms.

The expected outcome is an experimental demonstrator, or a simulated prototype, showing how explicit coordination and sensory-sharing protocols can improve safety, efficiency, and predictability in swarm robotics and autonomous mobility scenarios.

<i>Durata (mesi – max 12)</i>	6
<i>Durata (ore)</i>	150
<i>Numero di posizioni aperte</i>	3

Competenze richieste dal tirocinio

Requisiti tecnici: prospective candidates should have keen interest in decentralized and agentic cyber-physical systems, as well as design, development and analytical skills

<i>Altri requisiti</i>	problem-solving and open mindset; scientific reading/writing and documentation skills; team play; regular progress reporting
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