Postdoc in Performance Evaluation of Wireless Technologies for Robots Communication and Localization

This postdoc will take place at INSA Lyon, in the Inria Agora research group located in the La Doua Campus in Lyon. The recruited person will work with two members of the group: Dr. Oana Iova and Prof. Hervé Rivano in the framework of the European H2020 project BugWright2.

Keywords: WiFi, UWB, LoRa, Wireless Networks, Drones, Performance Evaluation

Context: The H2020 BugWright2 project proposes the use of an autonomous robotic system for outer hull ship inspection and service, composed of drones, autonomous underwater vehicles, and magnetic crawlers. As part of this project, the Agora research group is in charge of the communication hardware integration for the multi-robot system, and is involved in the communication and localization of drones.

Objectives: This work has a strong experimental component to ensure the realization of a successful demo by the end of the project. Integrating different types of robots into a single autonomous robotic system is very challenging, as they all use different communication technologies. Moreover, the environment inside a shipyard is not very suited to wireless technologies. The postdoc will have to first make a performance evaluation of existing WiFi technologies in this constraint environment and propose the best soution to be adopted. The second part of the project will focus on the intra-robot communication for path planning (for multi robot patrolling), fleet positioning (for environmental phenomenon tracking), and localization. Several technologies can be considered (e.g., UWB, LoRa, WiFi), and again, informed choices will have to be made for this specific environment.

Main activities:
1. Verify the feasibility of using 802.11ax on the existing robots by testing of-the-shelf equipment and make a performance evaluation of both 802.11ax and 802.11n in the specific environment where they will be used (i.e., in the presence of metal) as today there is no such information available.
2. Study and evaluate the technologies to be used intra-network for the communication between robots (e.g., for distributed coordination). The main candidates are LoRa 2.4GHz, UWB and WiFi. While some studies have been done on the advantages and disadvantages of these technologies [1], there is a lack of performance evaluation in the specific environment of a ship-yard. Some preliminary studies on the performance of UWB ranging in metal environment start to appear, however with a focus on localisation and not communication [2]. There are no such studies on the new LoRa 2.4GHz technology, which looks very promising.

Skills: Applicants should hold a PhD. in Computer Sciences, Telecommunication Engineering, or Applied Sciences with proven publication record are welcomed. The candidate should have previously worked with wireless technolgies (e.g., WiFi, LoRa, UWB). Good performance evaluation, wireless networking and systems, as well as practical skills with programming languages (e.g. C/C++, Python) are required. French language is not mandatory but welcomed. We look for empathic, proactive, and self-driven applicants.

How to apply and/or get further information: Candidates should send by e-mail a CV and a statement of purpose to:

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