

Proposal 1: Multiagent system for smart meta-sensor framework

Motivation

The forthcoming industrial environments will require a high level of automation to be flexible and adaptive enough to comply with the increasingly faster and low-cost market demands. Autonomous and collaborative robots will have an ever-greater role in this context. Robotics@DET laboratory aims at providing an interactive support for the human operator, within an industrial or logistic environment compliant with the industry 4.0 and/or Industry 5.0 requirements.

Objectives

The objective of the thesis is to develop a customized meta-sensor framework to enhance the perception system of the overall mobile agents, in particular, high sensing capacity mobile agents are used to support the ones that has limited sensing features. The framework should allow information sharing, e.g., human obstacles, between different platforms. In this way, path planning/replanning mechanism can be improved thanks to the knowledge of obstacles location beforehand.

The algorithms should be developed employing ROS-enabled platforms, such as the [LoCoBot WX250](#) and [TurtleBot3 \(Burger\)](#) mobile robot (Figure 1) and the computer vision algorithm should be able to identify human operators in an industrial-like scenario.



Figure 1. On the left: LoCoBot WX250 6DOF. On the right: Turtlebot3 Burger

During the thesis period, the student should investigate the state of the art of computer vision algorithms for object detection using ROS2 in the context of collaborative robots and relative applications in the industrial context, to identify the most suitable sensors and methods/tools to achieve the thesis' goal. The solution should be preliminary tested in a simulator and then on the real sensor system. If possible, the student shall apply the developed system on a real platform.

The student should test the algorithms on a simulation environment and/or real system at the Robotics@DET laboratory, located in Politecnico di Torino (Corso Duca degli Abruzzi, 24).

Requirements

- Preferably Robotics, Computer Science or Mechatronics background
- Knowledge of embedded systems and python/C++
- Knowledge of MATLAB/Simulink
- Linux OS knowledge will be considered a plus
- ROS1/ROS2 knowledge will be considered a plus
- Computer vision libraries knowledge will be considered a plus
- Ability to work in team, proactive mindset and problem-solving oriented

Duration

6-8 months

For further info refer to:

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