## Title: Mechatronics update and control architecture of a mobile base using ROS

Context:

The mobile base platform is a wheeled robot developed for the MBZIRC challenge (2017-UAE). The omnidirectional wheel and the innovative integration were patented [WO2018158445-PCT/EP2018/055214]. The mobile base integrates three omni wheels with BLDC motors which should be operated by ROS2.

Objectives of the internship:

- Understand the mobile base functioning mechanism, mechatronically update it and operate it on ROS2.
- Perform an update on the hardware components
- Build the control architecture of the mobile base, based on the EtherCAT as a communication protocol, for the connection between the microcontroller (slaves) and the PC (master) with the aim of controlling it by ROS (Robot Operating System).
- Control each of these motors using ROS2 and create a ROS2 package for the mobile base.
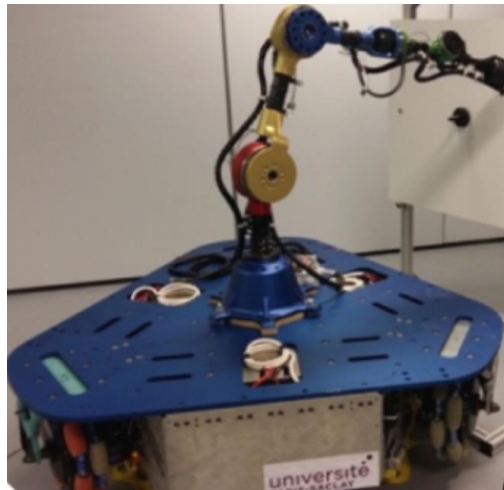
During the project, the candidate will explore different solutions and present a research proposal within two weeks, including a vision of the solution he intends to implement throughout the project cycle. Milestones will then be set to deliver parts of the project.

Required skills:

- Mechanical or electrical engineering background.
- Knowledge of C++ language or Python
- Understanding the principles of the ROS2.
- Microsoft Office suite (Word/Excel/Power point).
- Ability to work in a multidisciplinary team.
- English (Spoken and written).

Reference:

Alfayad, S.; Kardofaki, M.; Fouda, K. Omnidirectional Wheel and Vehicle Implementing Said Wheel, 2018

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