PhD program: Autonomous Systems (DAuSy)

Curriculum: C2 Autonomous Systems for Smart Environments

Research theme title: Multi-agent distributed coordination for workforce management with privacy by Design

Reference University: Università degli Studi di Cagliari

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Supporting Company: DEDEM s.p.a, Via cancelleria 59 00072 Aricca (RM)

Type of scholarship: DM 117/2023 – Project on PNRR (Italy's Recovery and Resilience Plan)

Description:

The proposed PhD project aims to address the management and optimization of a large workforce to improve operational efficiency in a specific context. The main objective is to develop advanced algorithms and methods for real-time task assignment, multi-vehicle routing and scheduling of technicians or agents, considering a large number of tasks and resources in the field.

In the initial phase, general and detailed specifications of the workforce management optimization problem will be formulated in collaboration with the industry partner involved in the study. Key performance metrics and constraints to be considered for optimization will be identified.

Subsequently, methods consisting of various algorithmic solutions for offline and online distributed optimization, will be developed. These methods will be capable of optimally assigning tasks to technicians or agents, considering the best routes and schedules based on the defined metrics and objectives. The goal is to create a system that can handle large volumes of tasks and field resources, with the ability to adapt in real-time to changes in the schedule due to unforeseen circumstances while preserving the privacy of the workforce, i.e., real-time position information about movements of the workforce must not be used.

In the final phase, experimental verifications will be conducted by integrating the optimization software with the operational systems of the industry partner. Field tests will be carried out with a properly trained workforce, following the instructions provided by the management software. Data will be collected during this phase to assess the system's performance and identify any necessary corrections or improvements to the algorithms and software.

References:

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