D5.1 SMARTHANDLE reasoning enablers – First prototypes

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement n° 101091792. This document reflects only the author's view, and the EU Commission is not responsible for any use that may be made of the information it contains.

Project Title	Resilient manufacturing lines based on smart handling systems
Project Acronym	SMARTHANDLE
Grant Agreement No	101091792
Instrument	Research & Innovation Action
Topic	HORIZON-CL4-2022-TWIN-TRANSITION-01-04
Start Date of Project	JANUARY 1, 2023
Duration of Project	36 months

Name of the Deliverable	SMARTHANDLE reasoning enablers – First prototypes
Number of the Deliverable	D5.1
Related WP Number and Name	WP5: AI-based multi-level performance optimization
Related Task Number and Name	T5.1 Multi agent AI resources interconnectivity - Architecture development T5.2 Product based single and multi-arm robot motion planning T5.3 Learning based grasping - Planning for known and unfamiliar workpieces T5.4 Online parameter adaptation for multi-level system reconfiguration (line, resource, tool)
Deliverable Dissemination Level	SEN
Deliverable Due Date	30/06/2024
Deliverable Submission Date	28/6/2024
Task Leader/Main Author	UPC

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Contributing Partners	All
Reviewer(s)	KUKA

Keywords

artificial intelligence, interconnectivity, software architecture, robotic planning, smart robotic grasping, multi-level reconfiguration, systems optimization

Abstract

This document presents the first scientific and technological advances of the SMARTHANDLE project regarding the reasoning enablers, which constitute the first set of prototypes developed within WP5. These enablers are key elements as they allow for a better adaptation to the varying conditions inherent to current industrial and processing lines (at both at product and line levels). In particular, these first advances can be grouped into four main groups, namely (1) the common architecture to implement and integrate all the developed modules to prepare them for their integration into the three SMARTHANDLE use-cases, (2) the smart and adaptive planning and execution of the manipulation or handling actions, (3) the smart grasping and manipulation of both known and unknown workpieces, and (4) the runtime parameter adaptation and system reconfiguration for optimal workpiece processing.

Executive summary

The main objective of the SMARTHANDLE project consists of the development of smart handling strategies able to tackle the current challenges of current industrial and processing lines and, in addition, to cope with both known and unknown workpieces. Based on that, the purpose of this document is to present the first prototypes for the reasoning enablers, as it was defined in Tasks T5.1 – Multi-agent AI resources interconnectivity - Architecture development, T5.2 - Product based single and multi-arm robot motion planning, T5.3 - Learning based grasping - Planning for known and unfamiliar workpieces, and T5.4 - Online parameter adaptation for multi-level system reconfiguration (line, resource, tool). After a brief introduction by UPC, the developed contributions by each partner are listed and described in detail in the four main sections (one per task) of the present document. Finally, a section dedicated to the conclusions summarizes the efforts done by the SMARTHANDLE consortium regarding the reasoning enablers as well as the future work directions.