WELCOME TO THE 4th ODIN NEWSLETTER!

January 2023

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DISCOVER ODIN

The challenge

While robots have proven their flexibility and efficiency in mass production and are recognized as the future production resource, their adoption in lower volume, the diverse environment is heavily constrained. The main reason for this is the high integration and deployment complexity that overshadows the performance benefits of this technology.

If robots are to become well accepted across the whole spectra of production industries, real evidence is needed that they can operate in an open, modular and scalable way.

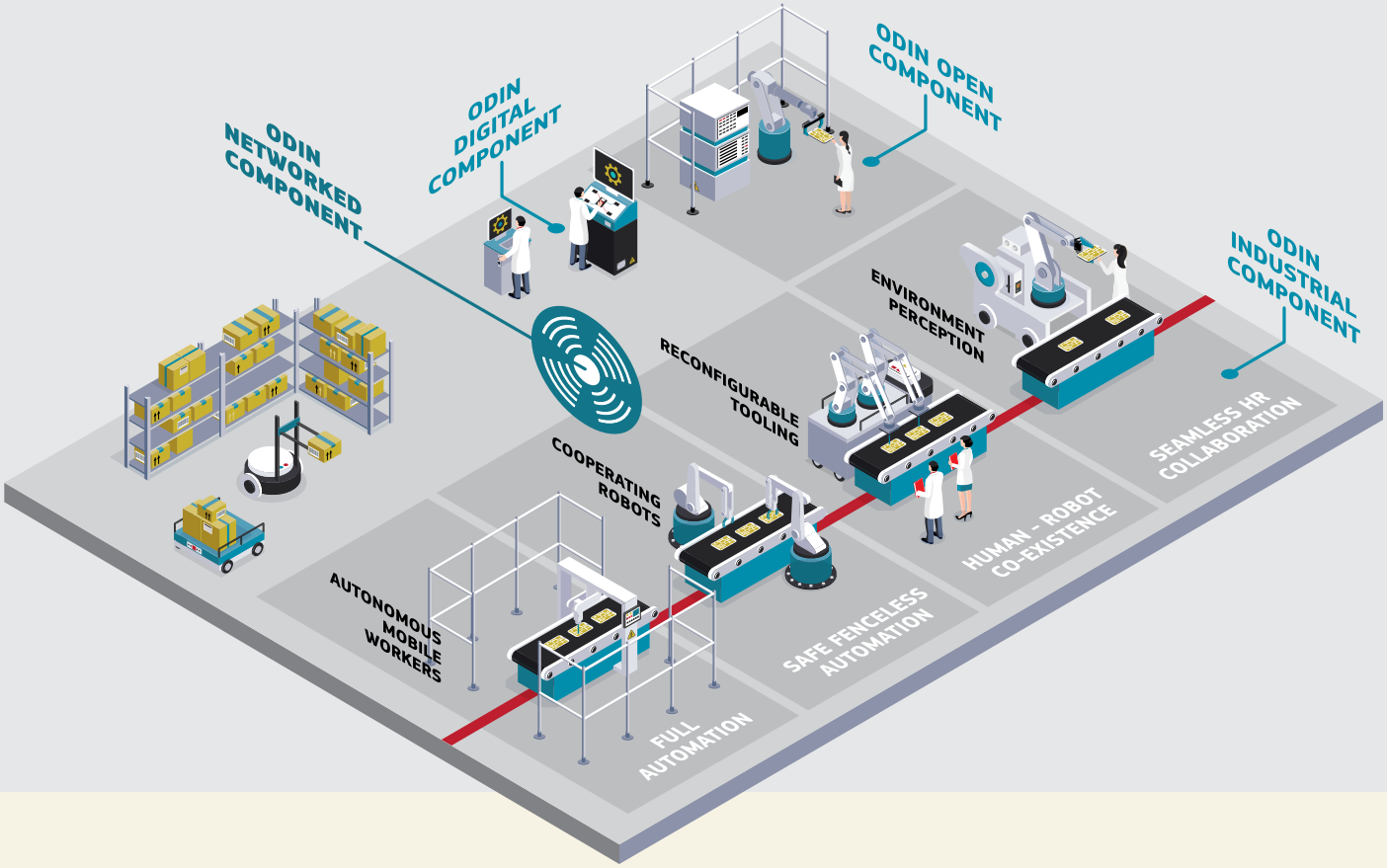
Project Overview

ODIN will bring technology from the latest ground-breaking research in the fields of:

- collaborating robots and human-robot collaborative workplaces
- autonomous robotics and AI-based task planning
- mobile robots and reconfigurable tooling
- Digital Twins and Virtual Commissioning and
- Service-Oriented Robotics Integration and Communication Architectures.

To strengthen the EU production companies' trust in utilizing advanced robotics, the vision of ODIN is:

"to demonstrate that novel robot-based production systems are not only technically feasible but also efficient and sustainable for immediate introduction at the shopfloor".



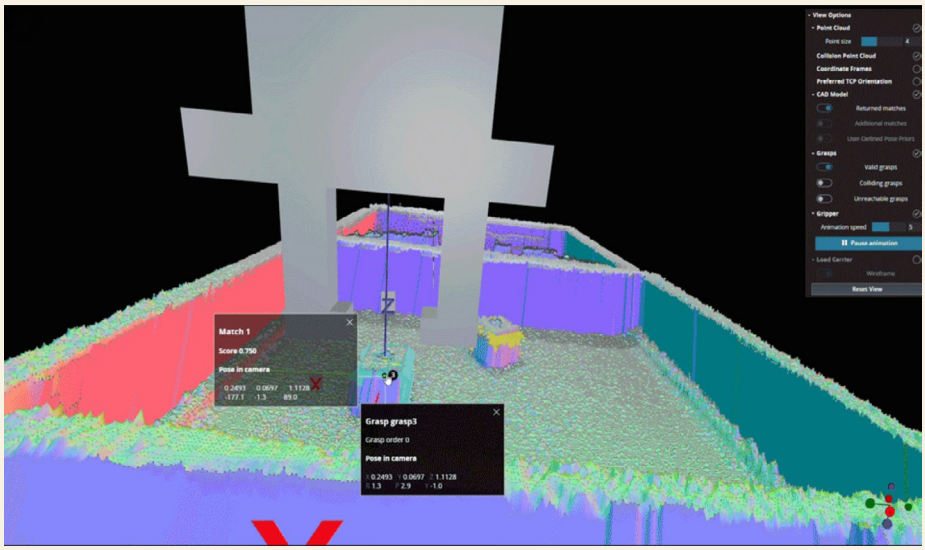
READ OUR LATEST BLOG POSTS

ENHANCE RELIABILITY IN BIN PICKING APPLICATIONS BY MINIMIZING RISK OF COLLISIONS

Roboception offers innovative 3D vision hardware and software solutions that enable any robotic system to reliably perceive its environment in real-time. Robot vision is the key to a more flexible use of robotic systems: If a robot is able to perceive its environment and workspace reliably, its tasks, workpieces or requirements can be changed and adapted rapidly.

The rc_reason suite of software modules is an advanced AppliedAI tool designed for robotic applications. As described in a previous post, the rc_reason CADMatch module offers the possibility to import a template generated from the object's CAD data into the system, in order to efficiently handle different objects autonomously. One of the major challenges in flexible production is to maintain reliability and robustness in different settings. Every collision in a productive cell leads to an interruption of production processes and requires staff to troubleshoot. Therefore, it is of great interest for a stable production environment to keep the error rate caused by collisions as low as possible. This can be done with the help of intelligent robot vision that checks for potential collisions during approach when calculating grasp points.

Read the full blog post here



RESOURCE DESCRIPTIONS AND RESOURCE CATALOGUE PLATFORM

A production system is expected to be composed of readily available resources, which have clear interfaces. In ODIN, Tampere University is developing and modelling resources as resource descriptions (RDs), which are a digital representation of real, physical production resources in association to the three industrial use cases. Developed resource descriptions include robots, grippers, sensors and other relevant components.

For each different resource, a resource description file is created and published by the resource provider. This description represents the basic characteristics, interfaces and properties of the resource. It can contain links to documentation, CAD models and to illustrative figures. One part of it, is also the capability descriptions which are coming from a centrally shared capability model.

The resource description files can then be saved to a catalogue, from where the potential users and various tools can utilize them. For example, resource descriptions can be searched, inspected, and distributed. This resource description catalogue is a public storage and provides a web service with RESTful API for application integration and is currently under development.

Read the full blog post here

SOFTWARE MODULES ORCHESTRATION IN HUMAN-ROBOT COLLABORATIVE ENVIRONMENT

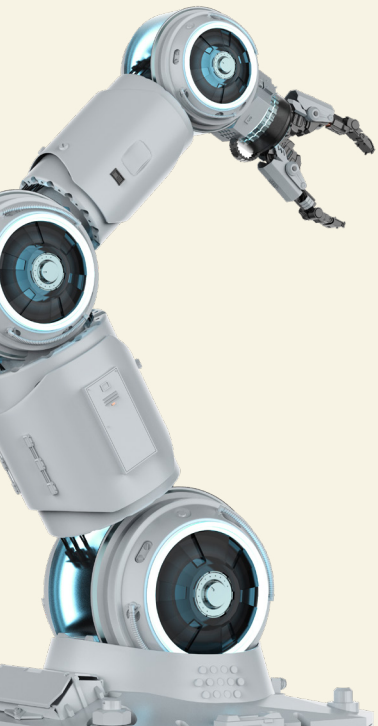
The ODIN project utilizes the OpenFlow software architecture, which has been designed for human robot collaborative systems. The OpenFlow software architecture is an integration and orchestration framework for flexible, responsive and robust HRC manufacturing systems. The approach is modular and is designed with scalability and extensibility in mind.

In the OpenFlow architecture the execution of tasks and actions are managed by the OpenFlow orchestrator software module. The OpenFlow connects with the ODIN AI Task Planning to get an optimized task plan that is then converted to a detailed OpenFlow production schedule. The OpenFlow orchestrator main functionality is the execution of an OpenFlow production schedule, which defines its interactions with other modules.

The OpenFlow production execution schedule models the tasks and actions that need to be executed by the production resources to implement a production order. The production schedule also models the system level reactions and recovery options in anticipation of disrupting events such as safety, security or different type of failures, such as equipment or network failure.

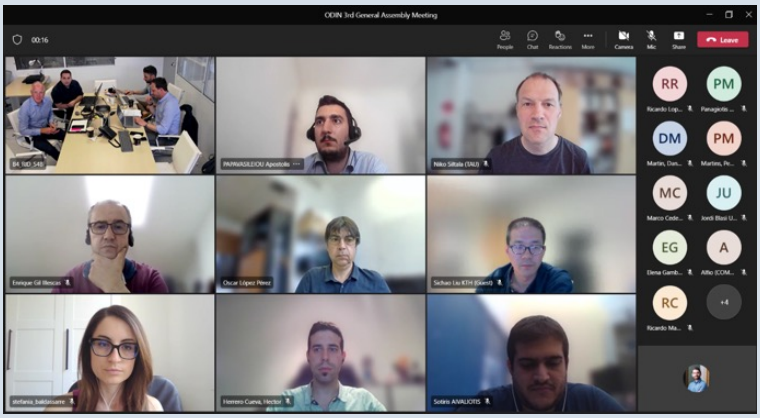
The production schedule model is comprised of a directed graph of actions, together with meta-information that group the actions into tasks and define how to dispatch the necessary commands for each action. Each action is a node in the graph and connects to other actions with directed vertices. Every vertex has a source action, a destination action and a vertex unique name. Vertices among the same source and the same destination actions are uniquely named.

Read the full blog post here



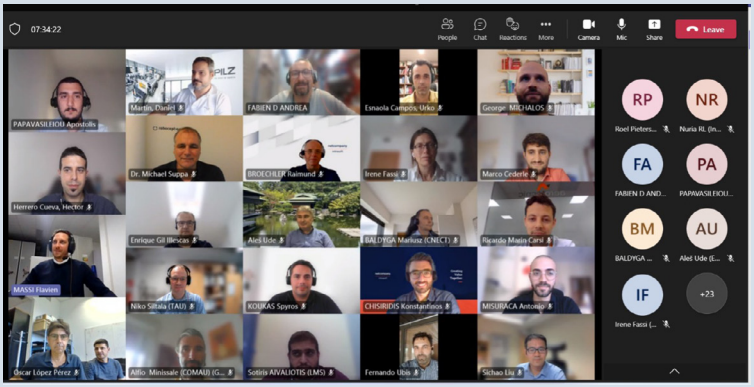
THE 3rd GENERAL ASSEMBLY MEETING

The ODIN consortium gathered again for the 3rd General Assembly of the project. The virtual meeting was the occasion to discuss the overall status of the project, its latest achievements, and the forthcoming activities.
The 3rd General Assembly also marked officially the end of Period 1, running from January 2021 to June 2022, and all the ODIN partners will now report to the European Commission. The Period 2 promises to be very interesting, as the partners will focus on the implementation of three large-scale pilot lines for the Automotive, Aeronautics and the White goods sectors.



RESULTS OF OUR 1ST TECHNICAL REVIEW BY THE EC

On the 14th of September 2022 the whole ODIN consortium attended the official review meeting with our Project Officer and three (3) external Reviewers selected by the European Commission. This review meeting covered the first project period going from 01/01/2021 to the 30/06/2022. The first period of any project is always critical as it sets the basis for a successful implementation and for reaching the expected results and beyond. ODIN is not different and the way we designed this project needed a good start and the full dedication of the partners, which has been acknowledged by the Reviewers.
After receiving the General Project Review Consolidated Report from the European Commission, we are happy to share with you that ODIN has achieved its objectives and milestones for the period. We are now fully dedicated to the 2nd phase of our project consisting in the implementation and demonstration of the ODIN Components within three (3) uses cases.



ADVANCED FACTORIES EXPO & CONGRESS 2022

The Advanced Factories is a world renown industrial trade show where the latest solutions on industrial automation systems, robotics, industrial software, artificial intelligence, artificial vision and virtual simulation solutions, Big Data, IoT, cybersecurity, Industrial Cloud Computing, Machine Learning, etc. We are really proud that our partner Pilz promoted the ODIN project and disseminated early results while participating in Advanced Factories 2022.

ODIN PROJECT AT BIEMH2022

The 31st edition of the International Machine Machine-Tool Biennial Exhibition BIEMH2022 took place in Bilbao (Spain) the 13-17 June 2022. The BIEMH exhibition is amongst the biggest international tradeshow in its field, offering a unique showcase of the most innovative technologies revolutionizing the machine tool sector (e.g. components, robotics, automation, manufacturing software, etc.)

The BIEMH2022 edition hosted not less than 1236 exhibitors, 230 panellists in the conferences and seminars while attracting a total of 35,000 participants from more than 52 countries. The ODIN project was well represented with three (3) partners attending the event and taking part to the exhibition.

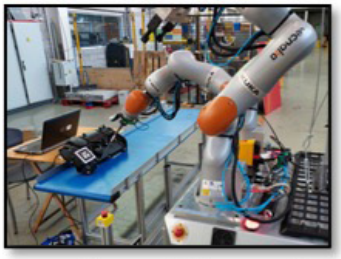
ODIN USE CASES

The ODIN consortium is currently working on the deployment and validation of its four technical components (e.g. Open Component, Digital Component, Networked Component and Industrial Component) within three Use Cases. Each Use Case targets a specific Large-scale pilot line with its own set of performance requirements, needs and on-site operations:

AUTOMOTIVE PILOT LINE

The implementation of the automotive pilot line is focusing on a flexible fenceless robotic system that promotes reconfigurability and collaboration with human operators. This ODIN pilot investigates the assembly process of a vehicle car engine. The selected assembly process is divided in 3 different operations, namely: i) the motor & gearbox assembly, ii) the additional parts assembly, and iii) the quality check. This pilot line consists of two different preliminary pilot setups. The first one is located at TECNALIA premises focused on the testing of ODIN screwing while moving solution. The second one is installed at LMS premises where the motor and gearbox assembly, but also quality check operations will be initially validated before transferring the solution to the end users.

Manipulation of motor



Screwing while moving

Quality inspection of engine parts

AERONAUTICS PILOT LINE

The Aeronautics pilot line focuses on the automation of the tasks related to the assembly process of the two parts for the Airbus A320 Neo Fan-cowls. There are three operations involved: i) drilling of holes on the two parts of the fan cowl, for the assembly components, ii) transport of the fan cowls between different workstations, and iii) inspection of the parts. The preliminary industrial setup of this pilot line has been prepared at TECNALIA premises targeting on the testing and initial validation of ODIN prototype modules. This setup consists of a fan-cowl, the TECNALIA mobile robot, different sensors for data capturing but also robot tools for required operations' execution.

Drilling operation

Transportation and handling

Quality inspection

WHITE GOODS PILOT LINE

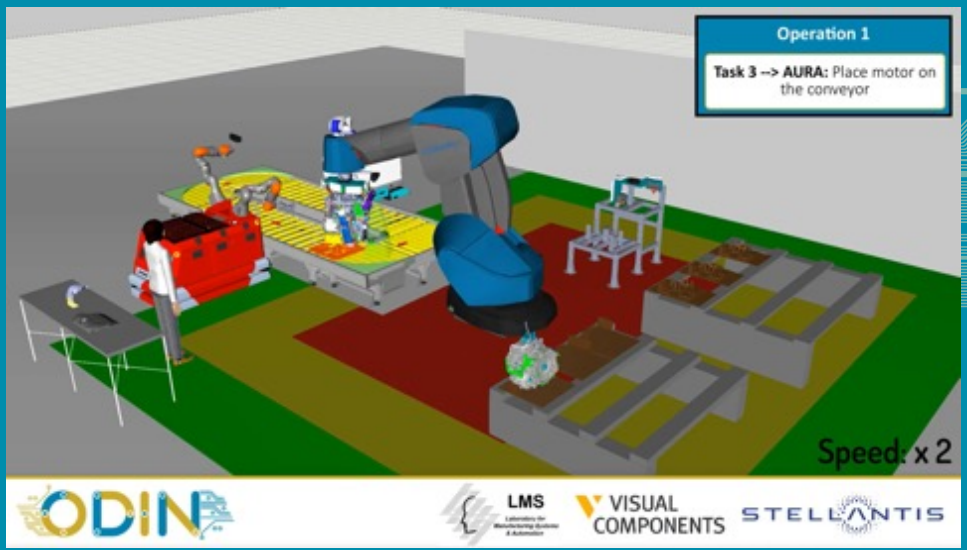
The implementation of White Goods pilot line focuses on making customization easier and improving the current cobot solution used in the pilot line. This use case is centralized on Human – Robot Collaboration for one transformer's installation in an oven but also cooktops and knobs placement on the top of a cooktop burner. The preliminary setup of this pilot at LMS premises consists of the selected collaborative robot UR10, the oven and cooktop burner parts to be assembled and custom made tables emulating the different working areas of the pilot line.

Manipulation of transformer for oven assembly at LMS premises

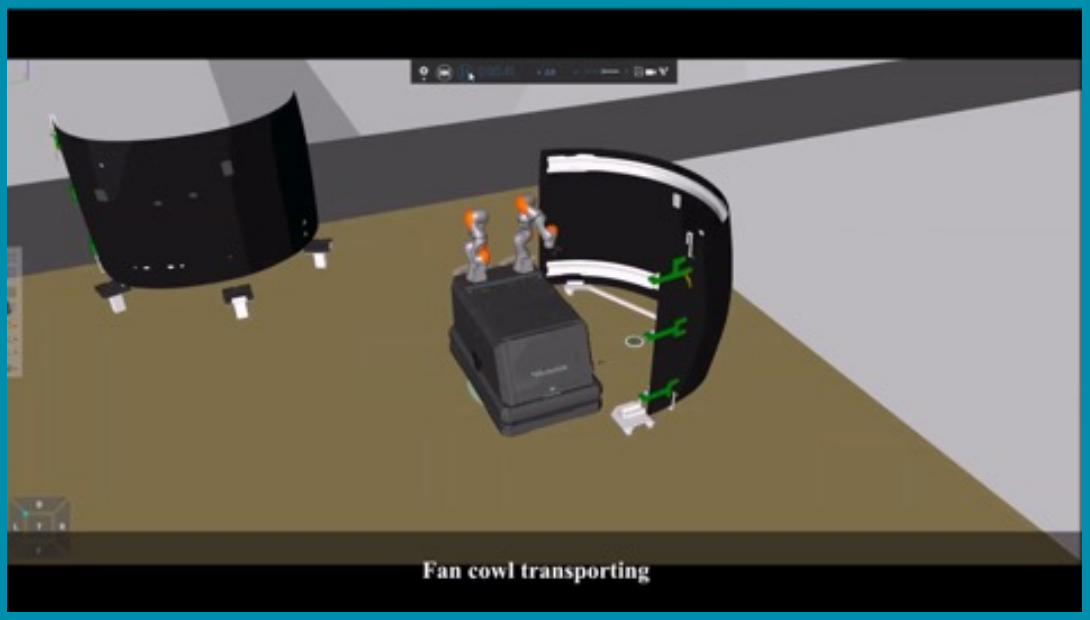
ODIN VIDEOS

Based on the early results of the deployment of ODIN Use Cases; the project decided to disseminate its results via its YouTube channel. Three (3) new videos presenting a simulation recording of our Industrial Use Cases has been made available on our YT channel and project website:

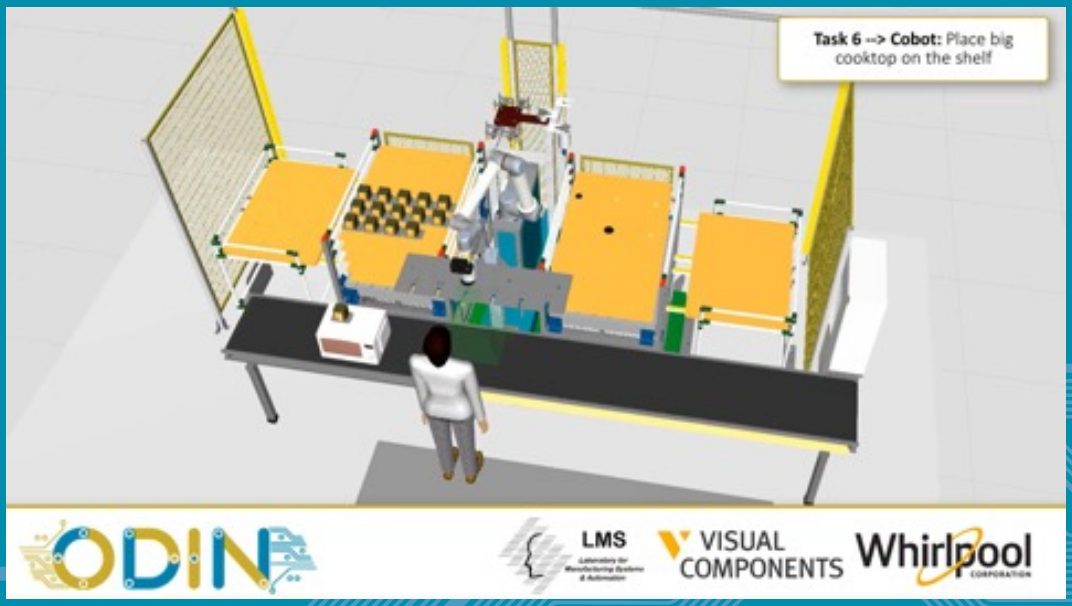
Automotive Pilot simulation

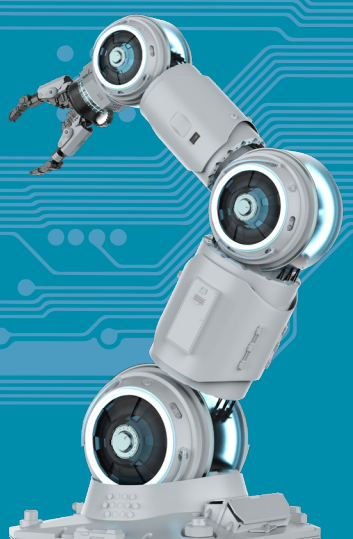


Aeronautics Pilot simulation



White Goods Pilot simulation





ODIN

Open-Digital-Industrial and **Networking** pilot lines using modular components for scalable production

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