ODIN

In this issue

Discover ODIN | **Our latest blog posts** | **Events**

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.
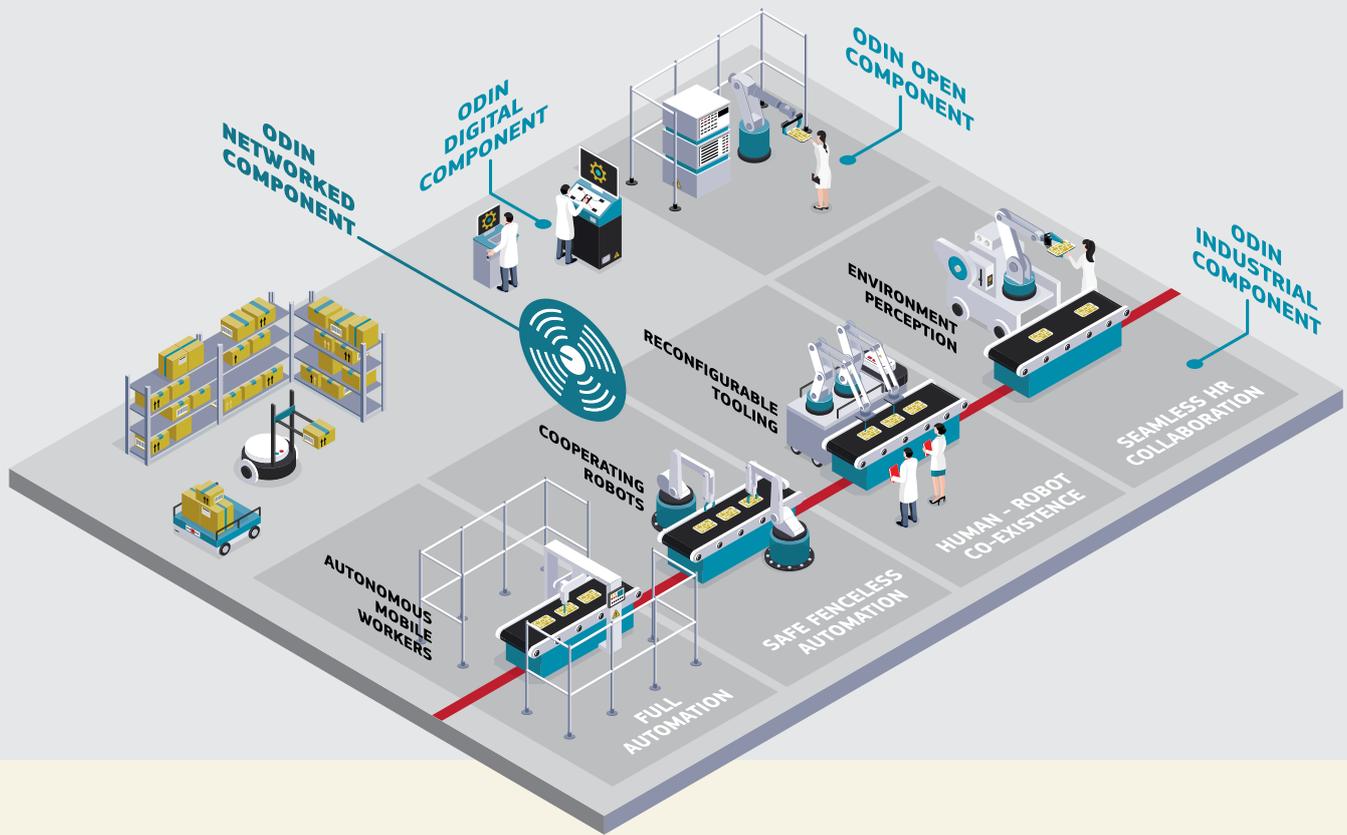

Project Overview

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".
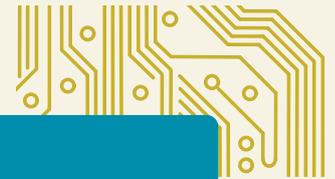
ODIN NETWORKED COMPONENT

ODIN DIGITAL COMPONENT

ODIN OPEN COMPONENT

ODIN INDUSTRIAL COMPONENT

ENVIRONMENT PERCEPTION

RECONFIGURABLE TOOLING

COOPERATING ROBOTS

SEAMLESS HR COLLABORATION

AUTONOMOUS MOBILE WORKERS

HUMAN - ROBOT CO-EXISTENCE

SAFE FENCELESS AUTOMATION

FULL AUTOMATION

READ OUR LATEST BLOG POSTS

FLEXIBLE AND ADVANCED MANUFACTURING IN AUTOMOTIVE SECTOR

It is widely known in the automotive sector that OEM customers strongly demand for lowering manufacturing costs, reduced logistics costs, lighter weight structures, new material requirements and a higher level of quality. Manufacturers of components for the transportation sector are studying the development of new technologies that will enable them to manufacture lighter and safer components, relying on the use of design and manufacturing tools that will enable them to produce lighter and safer components.

The following international trends are pushing production systems to their limits: Personalization, Globalization, Financial markets, Aging workforce, Sustainability, Population and middle-class growth, Information society and Urbanization.

Read the full blog post here

COMAU INTEGRATED MOBILE PLATFORM

The novel mobile platform by Comau is based on the integration of two COMAU stand-alone robotic resources: the Agile 1500 AGV and the Racer5 Cobot. The adoption of such integrated platform will allow an augmented flexibility in the production line as well as a high rate of reconfigurability of the platform in a complete collaborative and open environment.

The manipulation part of the platform is based on the Racer5 Cobot, a small robotic arm with a payload of 5 kg, a reach of 0.8 m and an accuracy of 0.03 mm. It can switch from collaborative to non-collaborative speed during operation using a laser scanner or virtual barrier. It provides hand guidance for moving and teaching, and it's equipped with LEDs that provide information on the status of the robot.

The Racer5 Cobot is mounted with a customized mechanical structure on the Agile 1500, an AGV manufactured by Comau capable of transporting up to 1500 kg of payload, and that can withstand a maximum towing force of 2100 N. The vehicle's differential drive architecture allows good stability and manoeuvrability, and it can independently, accurately and safely find the path to follow without colliding with people, machines or other AGVs.

Read the full blog post here

ENHANCING ROBOTIC PERCEPTION: HIGH DYNAMIC RANGE (HDR) IN MACHINE VISION

In the rapidly evolving world of robotics and intelligent automation, the ODIN research project is paving the way for revolutionary advances in robotic manufacturing systems. At the forefront: Roboception, an industry partner with expertise in 3D robot vision. In line with the project's goal, Roboception tackles critical challenges, most recently by introducing an HDR mode for the image acquisition to better address the different lighting situations in the various use cases in ODIN beyond model-based object detection.

High Dynamic Range Imaging, abbreviated HDRI or HDR, is a technique that has transformed imaging and photography. It allows users to capture a wider dynamic range of brightness than conventional digital imaging methods. Unlike the human eye, which can adapt to different lighting conditions, standard image sensors are often limited to 8 bits per channel, providing only 256 levels of brightness. This limitation results in overexposed highlights and underexposed shadows when capturing real-world scenes.

Read the full blog post here
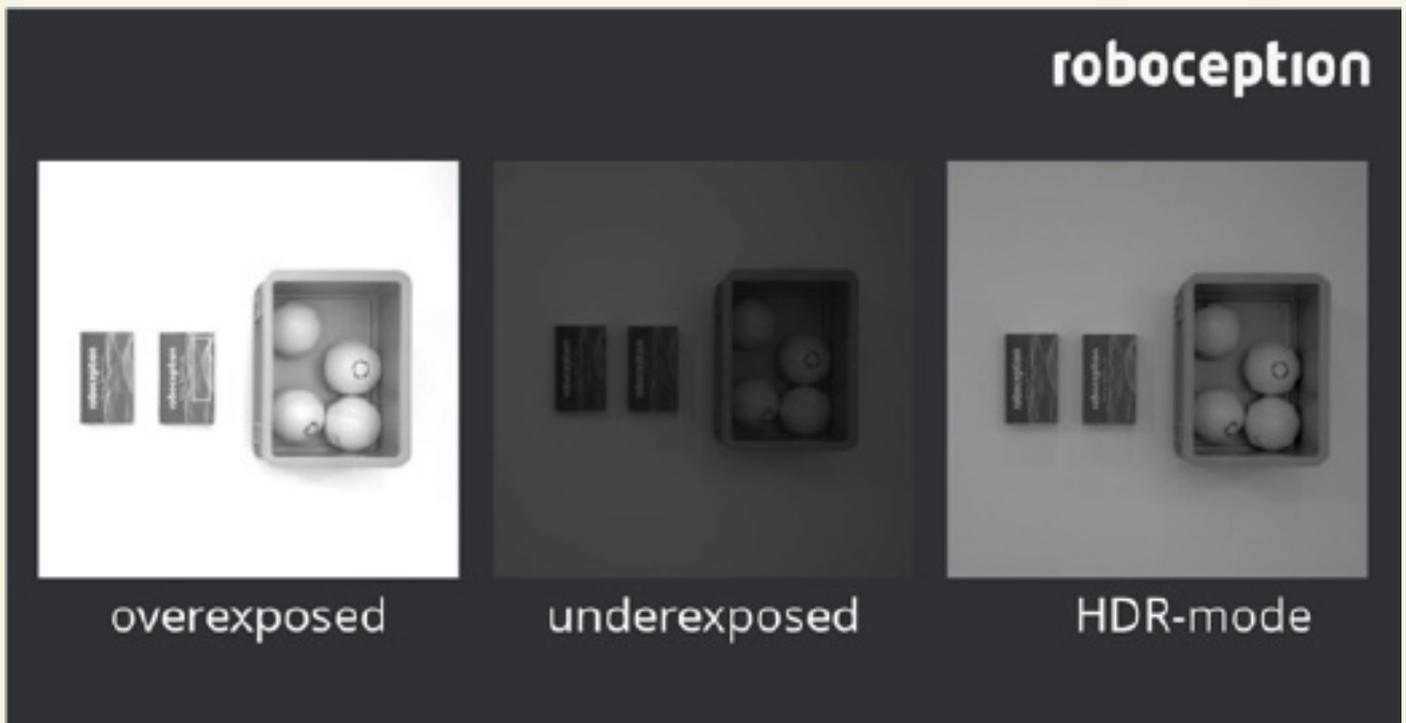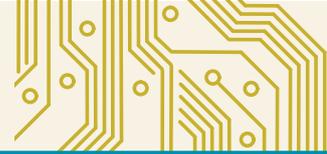
ROBUST HUMAN BODY SKELETON DETECTION AND HUMAN MOTION RECOGNITION

Human-Robot Collaboration (HRC) allows human operators to work side by side with robots in close proximity where the combined skills of the robots and operators are adopted to achieve higher overall productivity and better product quality. Under the concept of human-centricity in Industry 5.0, the robots should possess comprehensive perception capabilities so that the mutual empathy can be realized in the HRC assembly. Therefore, KTH has been working on the real-time perception of human operators in terms of the skeleton joints and ongoing motions.

For the human skeleton detection, a Kinect V2 sensor is involved that consists of a RGB camera, a 3D depth sensor, and multi-array microphones. A total of 25 body joints are detected based on the calculations from RGB camera and 3D depth sensor. Multiple persons in the field of view can be simultaneously analysed. For each detected body joint, the result includes the 3D cartesian position and 3D orientation with respect to the Kinect V2 coordinate system, as well as the tracking state and restriction state. The Kinect V2 sensor is calibrated first in the HRC system and the obtained position is normalized. To further enhance the smoothness and consistency of joint positions in successive snapshots, the Unscented Kalman Filter (UKF) is implemented upon the original trajectory of values.

Read the full blog post here
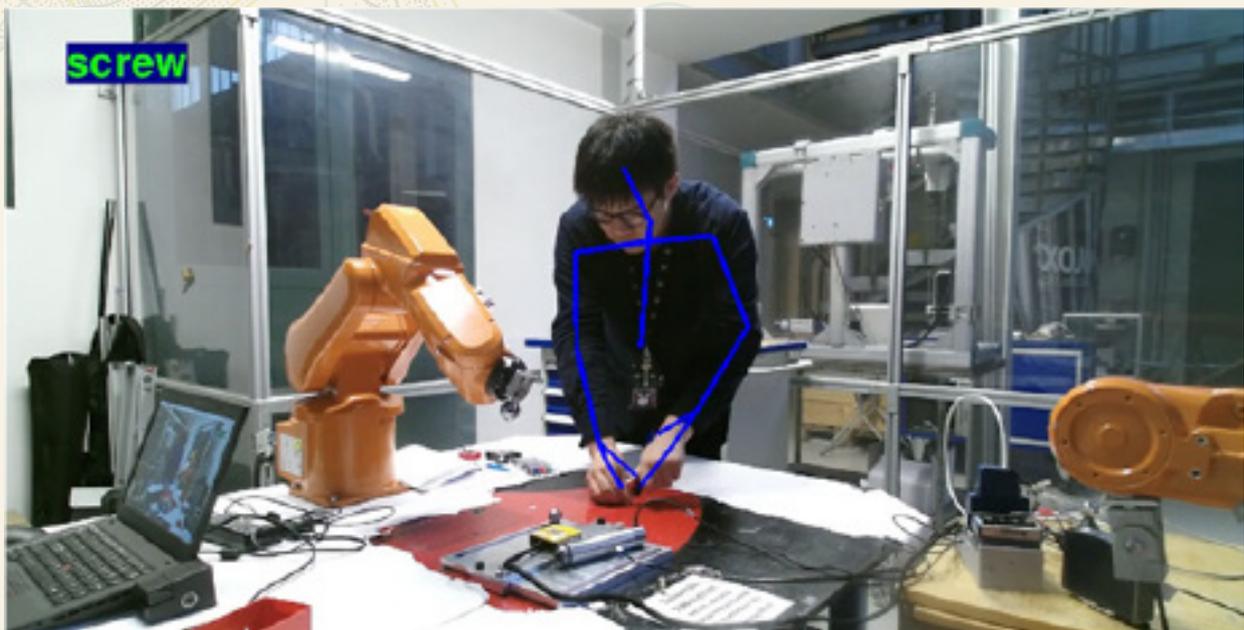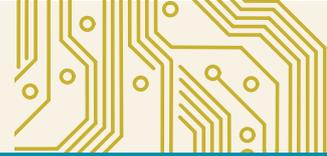
TRANSFORMING AUTOMATION IN THE AUTOMOTIVE INDUSTRY WITH MOBILE MANIPULATOR ROBOTS ASSEMBLING MOVING PARTS

In an industry where cadence and efficiency are crucial, the automotive sector faces the challenge of automating the assembly of moving parts. In response to this pressing need, TECNALIA, with the support of Stellantis, within the European project ODIN, is developing mobile manipulator robots capable of assembling moving parts in real-time. This innovative solution promises to revolutionize the way online assembly operations are approached, significantly enhancing efficiency and safety in automotive manufacturing plants.

Undoubtedly, one of the most pressing challenges in the automotive industry is the need to perform assembly operations on the move. In an environment where efficiency and precision are paramount, operators are compelled to carry out tasks on a production line that never stops. Often, they must move along with the line to keep pace. This scenario presents a series of challenges, including the need to maintain strict cycle times, ensure assembly quality, and, at the same time, ensure the safety of workers.

Read the full blog post here

On the 12-14 of July 2023, our Coordinator, the Laboratory for Manufacturing Systems and Automation, participated to the CIRP CME conference in Naples (Italy) and hosted a session on "Robotics & Human-Robot Collaboration" as Chairman. In addition, Laboratory for Manufacturing Systems and Automation presented two scientific papers relevant to ODIN project:
- A modular framework of robot gripping tools for human robot collaborative production lines
- An interactive Augmented Reality based framework assisting operators in human-robot collaborative assembly operations

EUROPEAN ASSOCIATION OF MANUFACTURING TECHNOLOGIES - CECIMO EVENT

On the 21 September 2023, the European Association of Manufacturing Technologies CECIMO organized the event "Redefining Manufacturing: Showcasing EU-funded initiatives in Agile Production". The ODIN Coordinator, Dr. Apostolis Papavasileiou, from LMS was invited as a speaker in the panel on "Agile Production - Unleashing Innovation in the Industry 5.0".
Thanks to his dedication and contribution to the excellent results obtained in the ODIN project and his involvement in cutting-edge research activities in the field of agile production, Dr. Papavasileiou made a great impression and put the light on the ODIN project. During the panel session with representatives from EFFRA and the EARASHI project, he discussed the latest advancements in agile production and emphasized on the importance of innovative solutions for agile manufacturing and robotics.

REDEFINING MANUFACTURING: SHOWCASING EU-FUNDED INITIATIVES IN AGILE PRODUCTION

21 September, 11:00 to 12:30 | Room 13/14, Convention Centre

Apostolis Papavasileiou

Senior Researcher, Laboratory for Manufacturing Systems and Automation

23CMH – THE FUTURE OF ADVANCED MANUFACTURING

Our Spanish partners, Tecnalia and DGH, participated to the 23CMH congress "The future of advanced manufacturing" on the 25-27 November 2023. They both participated in different sessions including the round table on "The factory of the future". They were able to present their vision and involvement in the technological development of the industry and the future perspective of the sector conditioned by new automation technologies and digital transformation, taking as example the work performed within ODIN project.

THE ODIN 6TH GENERAL ASSEMBLY MEETING

On the 19-20 of December 2023, the ODIN consortium gathers for the 6th General Assembly meeting of the project. The two-day meeting took place at Tecnalia's premises in San Sebastian (Spain) and was the occasion for the partners to see both, the automotive and the aeronautics demonstrators in operation.
The 6th GA meeting also marked officially the end of Period 2, running from July 2022 to December 2023, and all the ODIN partners are now reporting their good results to the European Commission.


ODIN VIDEOS

After the success of our last three videos of the pilot simulations we decided to extend our portfolio with a new video focusing on the Quality Inspection of assembled parts (Automotive Pilot).
Click on the image below or visit our Youtube channel: ODIN EU Project.
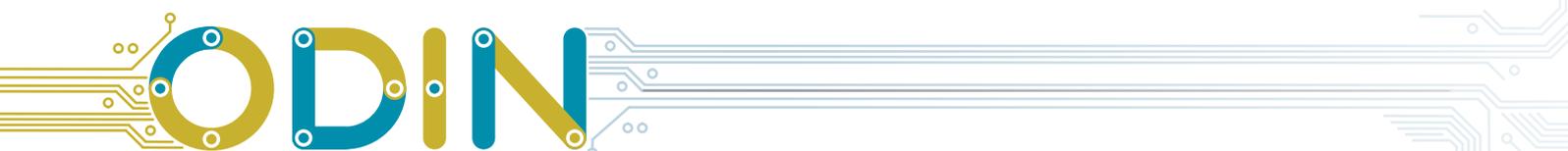2023, and all the ODIN partners are now reporting their good results to the European Commission.
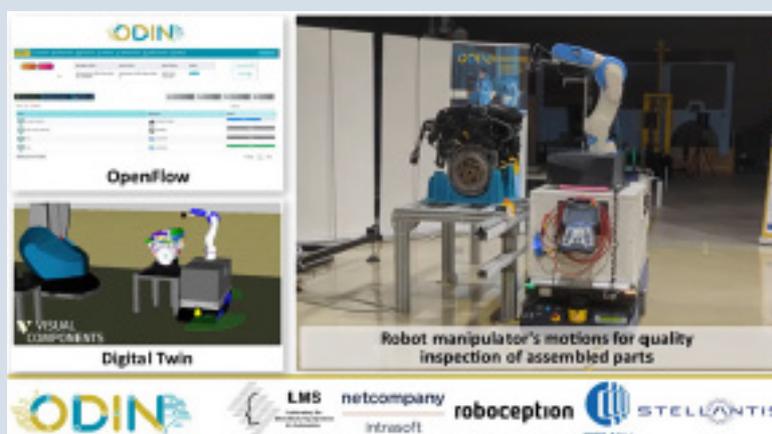
ODIN

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

LMS
Laboratory for
Manufacturing Systems
& Automation

tecnal:a
MEMBER OF BASQUE RESEARCH
& TECHNOLOGY ALLIANCE

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VETENSKAP
OCH KONST

Tampere University

STELLANTIS

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