CONVERGING

Social industrial collaborative environments integrating AI, Big Data and Robotics for smart manufacturing

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The ambitious vision of CONVERGING is to develop a human–robot collaborative social–industrial environment by bringing together the advances of Big Data, AI, Robotics, and Social Sciences and Humanities for safer, more flexible, reconfigurable, and modular production environments.

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Discover CONVERGING

The **CONVERGING project** aims to develop, deploy, validate and promote smart and reconfigurable production systems including multiple autonomous agents (collaborative robots, AGVs, humans) that are able to act in diverse production environments.

The diversifying factors will be a multi–level AI–based cognition system that takes advantage of the collective perception (Digital Pipeline) of the resources, enabling them to interact seamlessly coexist with humans under a "social industrial environment" that ensures trustful, safe and inclusive user experience.

The systems will have five key features:

1. **Perceive:** The ability to identify and understand processes, resources, and environments and their status through the use of Big Data, Real Time Integration & Communication Architecture, Digital Twins and Human in the Loop techniques.

2. **Reason:** Analyze the production system status and independently form plans using AI, Planning and Reconfiguration Algorithms as well as Resource Autonomy solutions.

3. **Adapt:** Automatically modify hardware and control systems to implement formulated plans using Robotics and Autonomous Systems, Smart Devices and Adaptable Mechatronics.

4. **Collaborate:** Work seamlessly with humans or other resources, creating a social industrial environment which exploits Smart Human Machine Collaboration, User experience assessment and User centric workplace design.

5. **Innovate:** Expand its capabilities and Openness via an Open Pilot Network as well as links to local and international innovation ecosystems.

Discover the CONVERGING Use Cases

Below, you will explore the core use cases of the **CONVERGING project**. Join us, as we delve into the details of how this initiative is reshaping industries through collaboration between humans and robots.

FORD Use Case: Streamlining Stamping Plant Operations

Current Status: In the automotive industry, precision is paramount. The production journey begins in the Stamping plant, where single panels undergo a meticulous process involving multiple stations and operations.

The high-level target of CONVERGING for this use case is to increase the level of automation by introducing robots that will undertake the repetitive sanding procedure, while the operators can focus on visual quality inspection, reducing ergonomic risks and improving efficiency and performance of the stamping process.

CONVERGING Vision: Our mission is to automate the labor-intensive manual process. Introducing AI-empowered collaborative robots to undertake repetitive tasks, we ensure quality, reduce ergonomic risks, and elevate the efficiency of the stamping process.
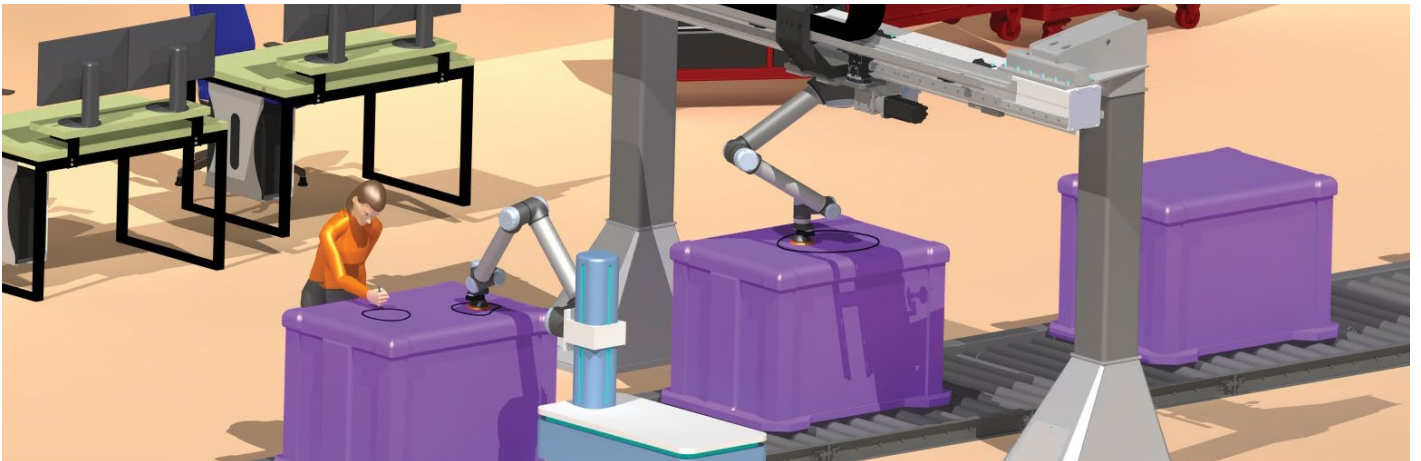
ELUX Use Case: Elevating Hob Manufacturing

Current Status: The manufacturing processes are very heterogeneous and complex and involve both automatic and manual assembly tasks along their lines. Within the CONVERGING project, attention centers on the manual assembly of hobs, including gluing, enamel, pressing, and electrical component assembly, optimizing manufacturing processes.

CONVERGING Vision: We're introducing a human-dual arm humanoid robot collaborative approach. By combining human expertise and robotic precision, we're streamlining assembly processes, ensuring reliable connections, and enhancing production efficiency. AI methods for classification and anomaly detection will be used to monitor the assembly with force sensors and cameras, and human demonstrations or corrections will be requested when the perception system has low confidence.
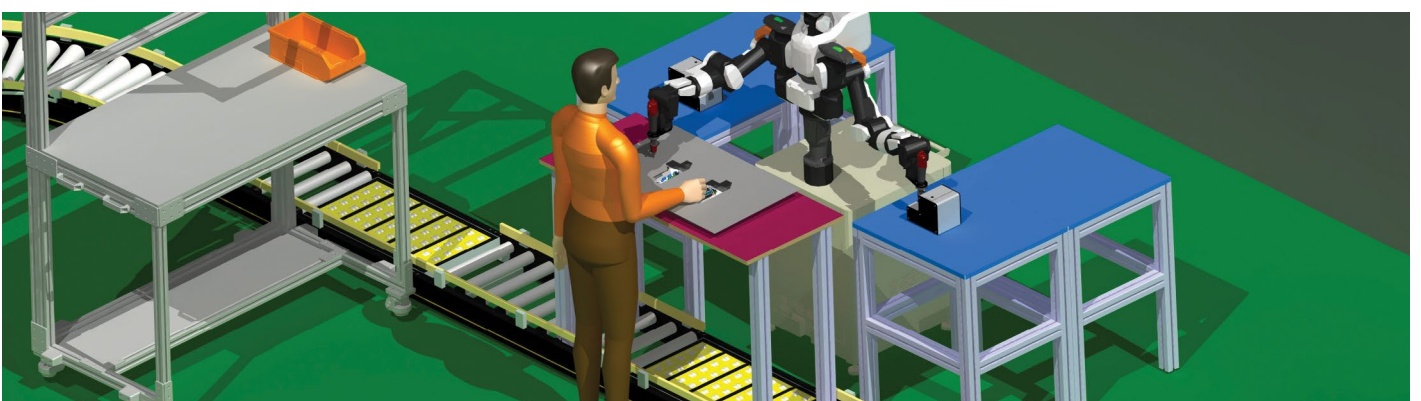
IAI Use Case: Improving Aircraft Fuel Tank Maintenance

Current Status: One of the services which are provided by IAI is fuel tank maintenance. A fuel tank is a hazardous working environment with limited access, ergonomic risks, and the need for two operators create challenges. Moreover, special equipment needs to be used to eliminate the possibility of explosions due to any possible sparks. This makes the maintenance task very complex from a technical point of view, especially regarding the wing fuel tanks.

CONVERGING Vision: In CONVERGING we aim to revolutionize aircraft fuel tank maintenance by introducing smart collaborative robots equipped with flexible end effectors and advanced vision sensors. Our smart collaborative robot system is equipped with AI and advanced sensors, which reduces risks, increases efficiency, and ensures safe operations in dangerous environments.
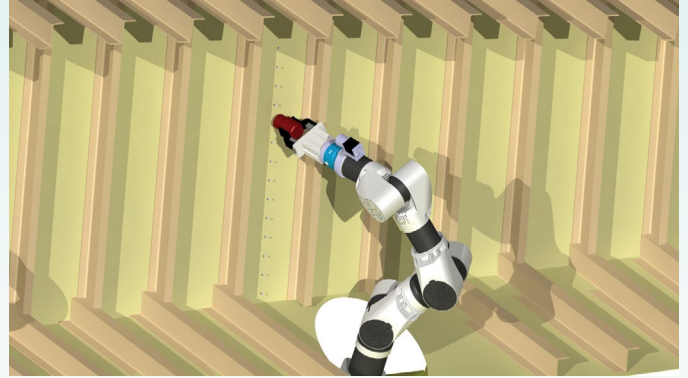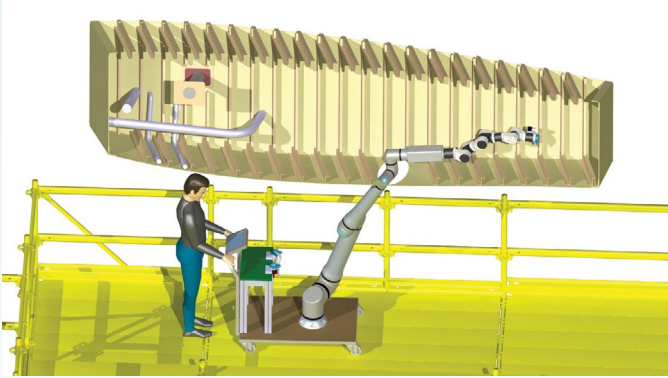
PRIMA Use Case: Enhancing Additive Manufacturing Post-Processing

Current Status: Additive manufacturing offers complexity but presents challenges in post-processing. In most of the cases, supportive structures are needed on the parts during the manufacturing to enable the creation of several geometries. Therefore, post processing involving support removal is necessary. This operation is currently performed manually by specialized operators. It is a difficult process as there is high chance that the operator damages the part during the support removal as the tolerances are strict.

CONVERGING Vision: We're implementing Human-Robot Collaboration (HRC) and AI to streamline post-processing. Robots work in tandem with operators to ensure precision, safety, and consistency, reducing costs and improving quality. The operator will have the ability to train the robot for the processing of different parts via hand-guiding and/or gestures and thus increase the variety of parts which can be handled. Using data gathered after processing each part the robot will be able to improve its precision and improve the process quality. The relevant data generated by the process will be stored in a database and retrieved in next iterations as needed.

Partners

The EU-funded CONVERGING project brings together 16 high-profile partners from several EU and Asian countries consisting of 5 research organizations and eleven industrial partners.

Contact us:
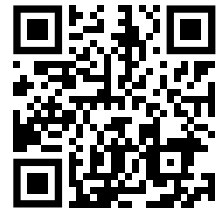
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