MASTERLY - Nimble Artificial Intelligence driven robotic solutions for efficient and self-determined handling and assembly operations

2024 Manufacturing Partnership Day

7- 8 May 2024

Brussels

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MASTERLY - Meet the Project

Funded under **Horizon Europe** work programme

Topic: HORIZON-CL4-2022-TWIN-TRANSITION-01-04 - Intelligent work piece handling in a full production line (Made in Europe Partnership) (RIA)

GA: 101091800

Start date: 1st Jan 2023

End date: 30th June 2026

Duration: 42 Months

MASTERLY Motivation

Thin and limp objects: Electrolyzers, batteries, textiles

Large, flexible panels

Branched non-rigid structures: Wiring harnesses for battery systems

Scratch-sensitive, flexible objects: solar cells, displays

Versatile handling of objects with shape variety: High-mix production

... and other applications in settled markets: Food processing, logistics,...

Source: Siemens Energy. https://press.siemens-energy.com/global/en/pressrelease/siemens-energy-start-production-hydrogen-electrolyzers-berlin
Source: Formhand. https://www.formhand.de/
Source: Electrive. https://www.electrive.com/wp-content/uploads/2018/12/audi-e-tron-quattro-batteriemontage-battery-assembly-1.png
Source: Unikiel. www.uni-kiel.de/download/pm/2016/2016-422-1.jpg
Source: Formhand. https://www.formhand.de/

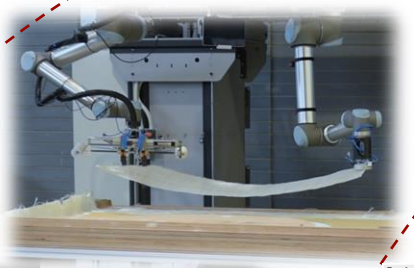
MASTERLY Motivation

Market

Degrees of freedom?
Deformation?

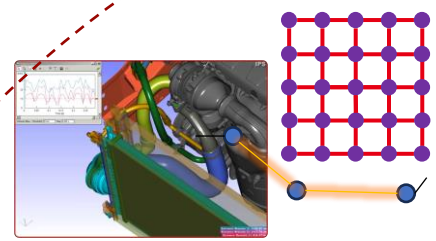
Manufacturing challenges

Properties?
Engineering complexity?

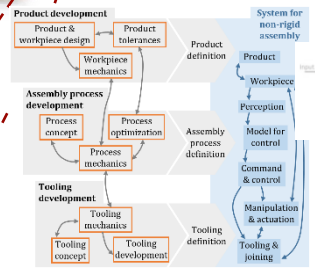


Superior solutions

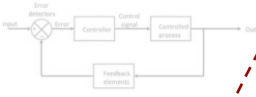
Modelling



Engineering Methods

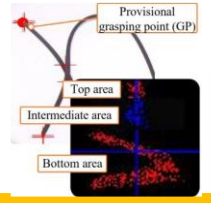


Control



Recent developments

Sensing



Handling tools

Lessons learned

Industrial trends

Technology gaps

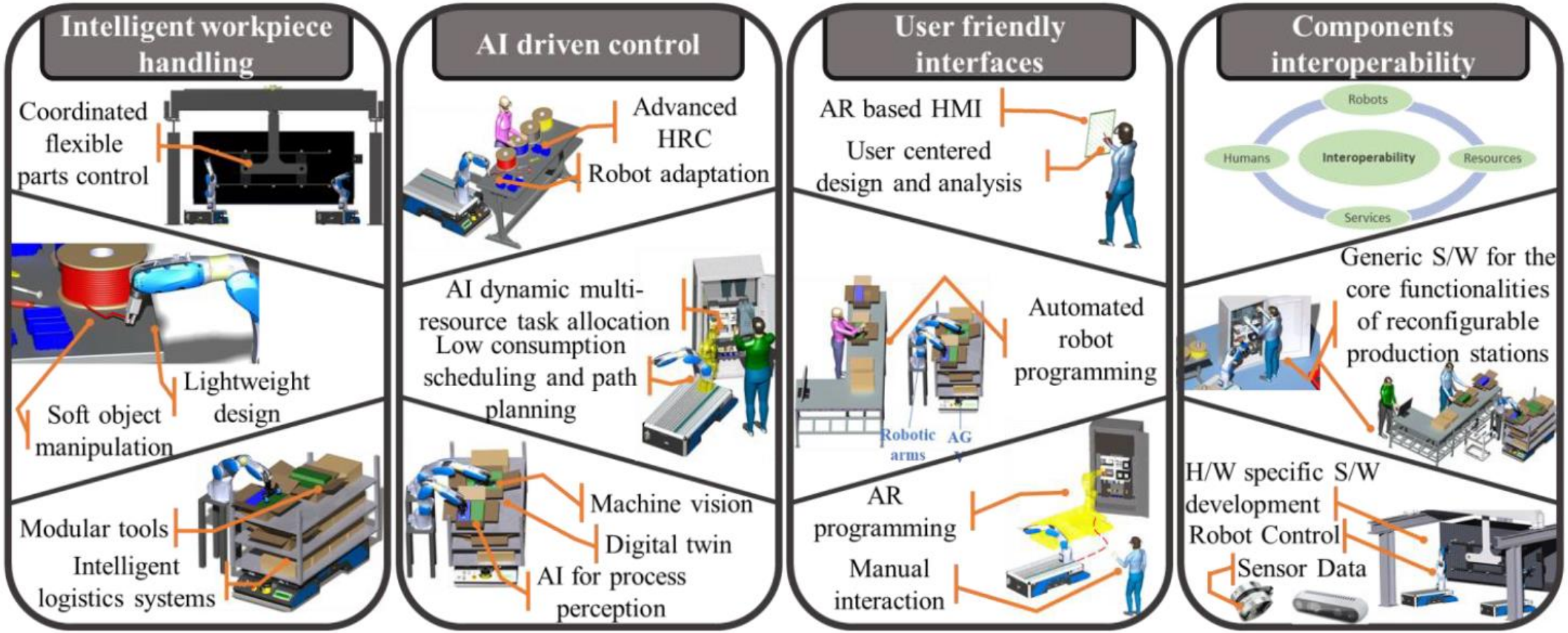
Future directions

Conclusions

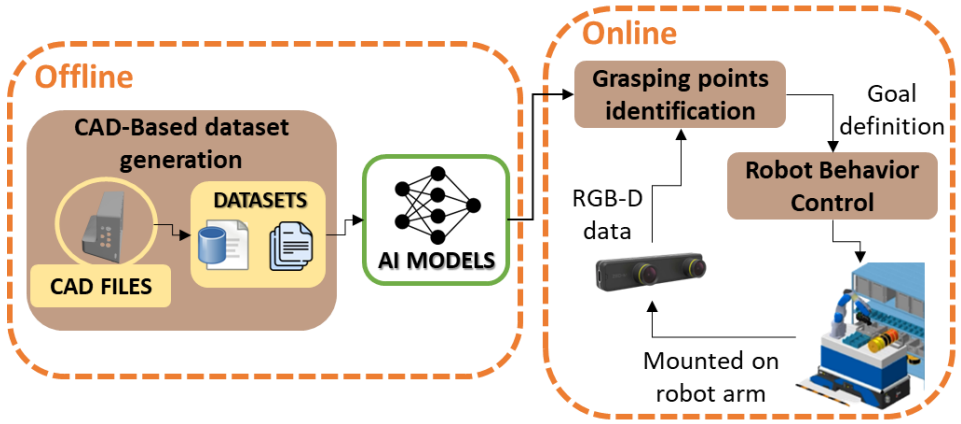
Standardization

MASTERLY – Concept

MASTERLY – Components

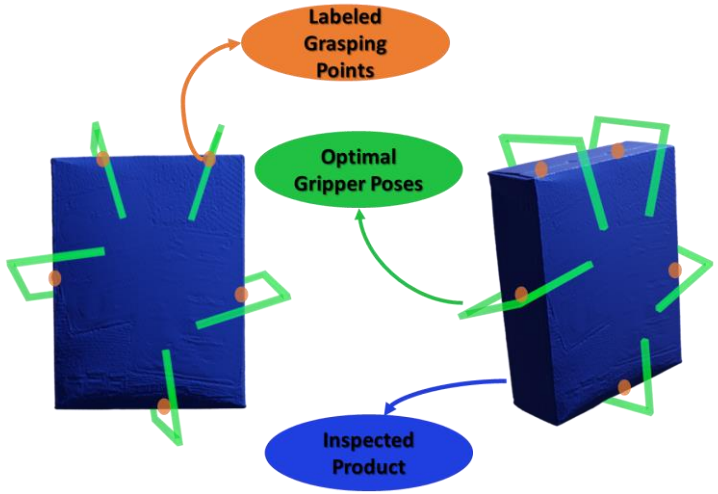


MASTERLY – Highlights of AI use

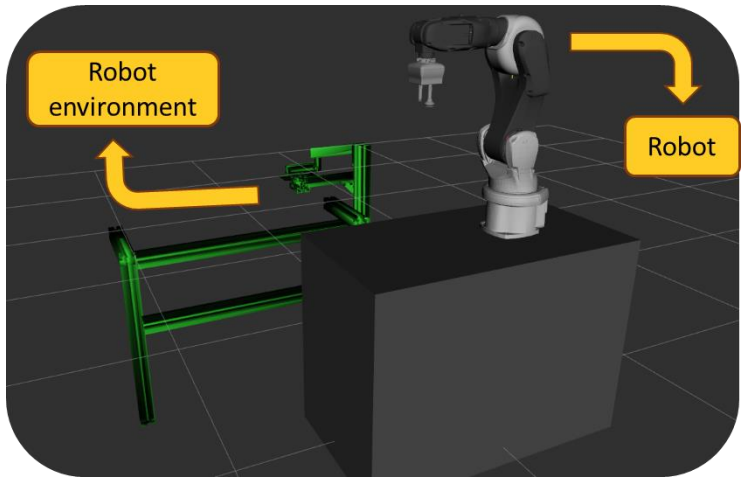


Robotic Object Manipulation (ROM)

CAD-Based Dataset Generation

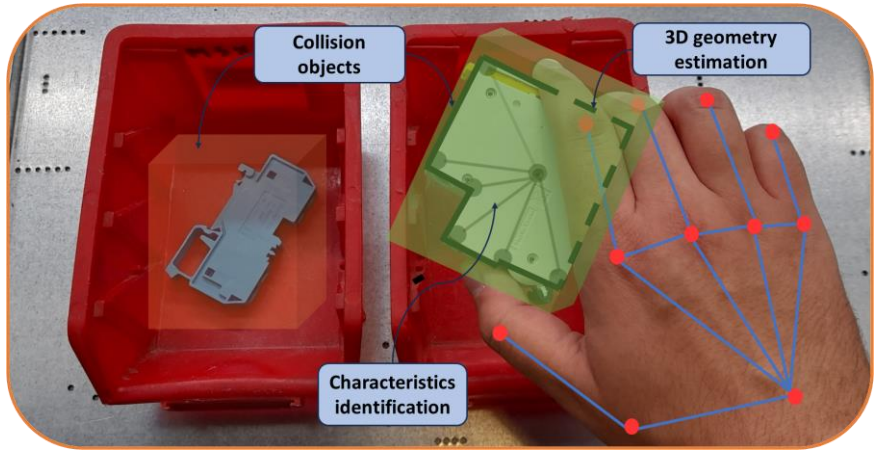


Grasping Point Identification

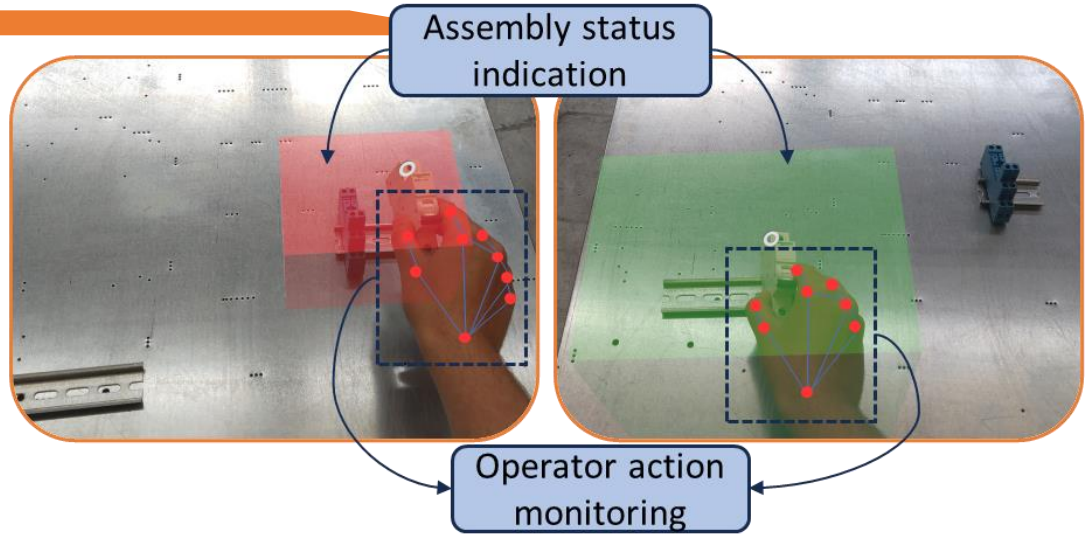


ROS2-Based Robot Behavior Control

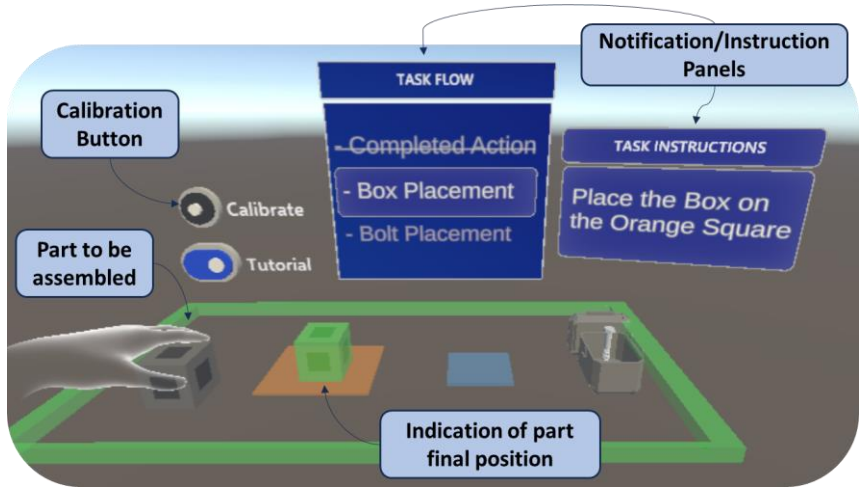
MASTERLY – Highlights of AI use



Human Action Recognition



Human Action Execution Monitoring



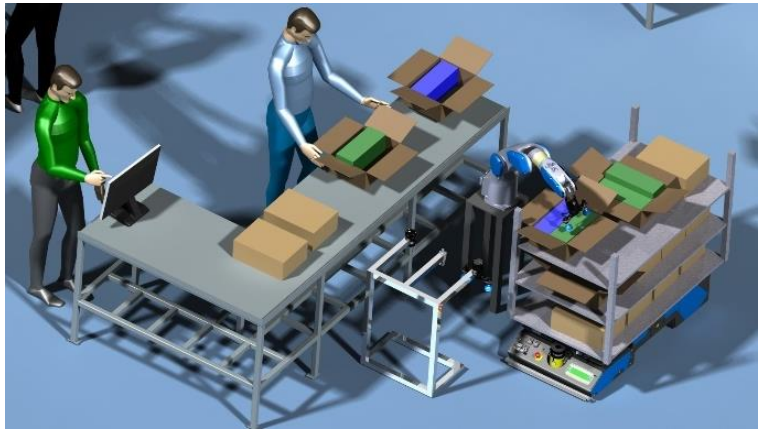
Augmented Reality (AR) Application

MASTERLY Pilots

KLEEMANN

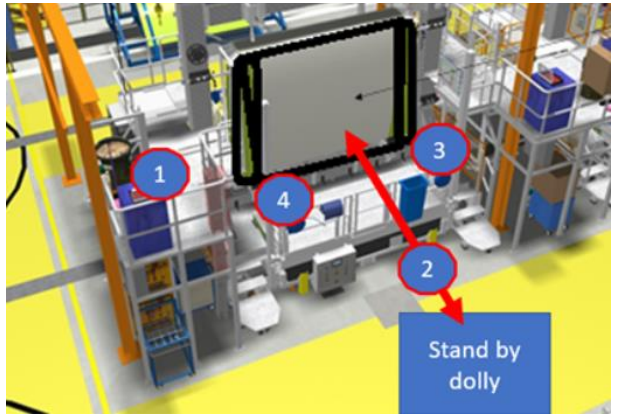
A **hybrid human-robot collaborative shop floor** to automate intra-shop floor logistics and assembly operations

DECATHLON



An **autonomous robotic system** for unpacking products from storage containers and preparing automatically the order boxes.

AERnnova



A **sensor network** to monitor the operations, reduce collisions and swinging, using an **intelligent fixture with smart modules** for fine positioning of the elements

MASTERLY News

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YouTube
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Thank you for your attention!

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