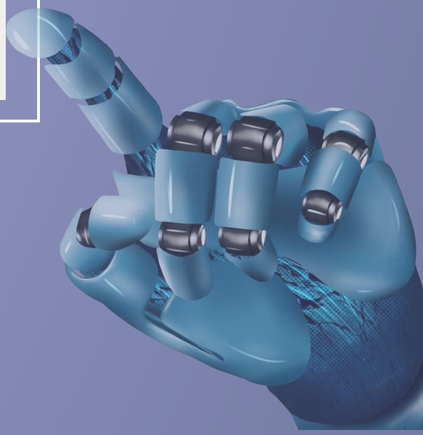
The Manufacturing Partnership Days 2026

17-18 November, Brussels, Belgium

Advancing AI driven Human Robot Interaction in Agile Manufacturing and Inspection & Maintenance applications



LMS Laboratory for Manufacturing Systems & Automation

Zoi Arkouli, Research Engineer LMS, University of Patras

Funded by the European Union

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JARVIS at a glance

GA nº 101135708

Funded by the Horizon Europe under Grant Agreement nº 101135708.

Started in January 2024, running for 48 months (to December 2027).



16 partners from 11 countries:

LMS Laboratory for Manufacturing Systems & Automation

cea

Netcompany

Collins Aerospace An RTX Business

KUKA

TOFAŞ TÜRK OTOMOBİL FABRİKASI A.Ş.

Cranfield University

EDF

tecnalia MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

SINTEF

F6S

cecimo European Association of Manufacturing Technologies

Teaching Factory

equinor

Tampere University

EFFRA EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION

JARVIS Motivation & Vision

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Although HRI solutions have been proposed the wider industrial adoption is lagging

Limited robot cognition

Limited semantic understanding of task, context and human intent.

Low performance

Shared operations are often slower than doing the job by hand.

Complex programming

Every change needs a robotics expert most SMEs don't have.

Low fluidity and trust

Interaction feels unnatural, which hurts operator acceptance.

JARVIS vision is to:

"develop a **reusable set of tools** that enable **AI-driven multimodal** interaction: a) involving **interfaces** for **physical** and **remote** information exchange, robot control and programming, b) offering **social skills** to a variety of robots to achieve **seamless user-centric interaction** that **extends human ability** for complex tasks and c) demonstrating **scalability** of application and ability to achieve **economies at scale**. "

JARVIS Technological Areas

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INTERACTION
AI-enhanced interaction

Intuitive commanding & programming

- VR teleoperation
- Robot control module
- Teaching by demonstration
- Human-robot interaction module
- Generation of robot programs



USER-CENTRIC
Social interaction

Fit the robotic system to the person

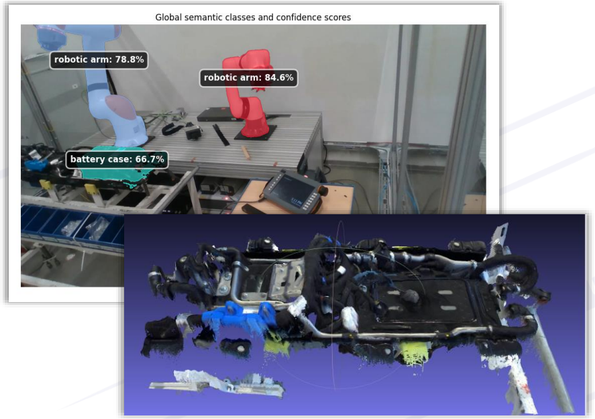
- User-centric interfaces
- Robot behaviour adaptation
- Human-centred approach based on operator acceptance evaluation



COGNITION
Intelligent mechatronics

Enable robot perception

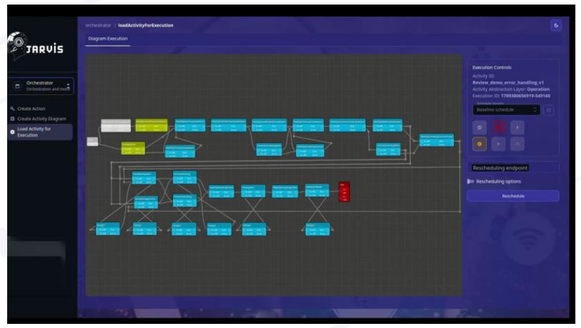
- Multi-sensory perception
- Human intention perception and prediction
- AI task planner
- Intelligent digital twins
- Smart mechatronics



TRUST
Security, privacy & safety

Offer trustworthy solutions

- Safe AI-driven interaction
- Orchestrator
- Ethics in data capture and processing



JARVIS Large-Scale Pilots

GA nº 101135708

PILLAR 1 · AGILE MANUFACTURING – CLOSE HRI




Aeronautics

Collins Aerospace
An RTX Business




Automotive

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PILLAR 2 · INSPECTION & MAINTENANCE – REMOTE HRI



Nuclear energy

EDF



Offshore energy

equinor

JARVIS Large-Scale Pilots

JARVIS
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PILLAR 1 · AGILE MANUFACTURING – CLOSE HRI




Aeronautics

Collins Aerospace
An RTX Business

Aircraft-seat production

Cobots take repetitive, strenuous steps

AI defect detection and XR support quality checks






Automotive

TOFAŞ
TÜRK OTOMOBİL FABRİKASI A.S.

Hybrid battery-pack assembly

Cobots add strength and precision in a reconfigurable, operator-friendly cell



PILLAR 2 · INSPECTION & MAINTENANCE – REMOTE HRI

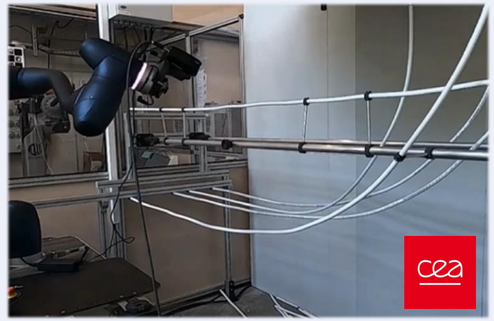


Nuclear energy

EDF

Power-plant decommissioning

Immersive VR teleoperation keeps operators away from radiation





Offshore energy

equinor

Offshore inspection

Mobile robots with AI perception inspect hard-to-reach areas, remotely supervised



Extending JARVIS Technologies to New Domains

GA nº 101135708

EXTERNAL PILOT OPEN CALLS

For technology adopters

Industry and SMEs, together with integrators, deploy JARVIS tools in a new pilot or use case.

up to **€130,000**

per project · up to 13 projects · €1.69M in total

CO-DEVELOPMENT OPEN CALLS

For technology developers

Providers and integrators add new features or modules to JARVIS and validate them in the pilots.

up to **€100,000**

per project · up to 8 projects · €0.8M in total

First call: external pilots already span sectors far beyond the original use cases

Shipbuilding · Textiles · E-waste & circular economy · Remanufacturing · Energy · Chemicals · Plastics · Healthcare

JARVIS to Different Application Domains

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AUTOMOTIVE REMANUFACTURING
REPAIR



CHEMICAL INDUSTRY
FA-EMAT



SHIPBUILDING
TELEWELDER



ELECTRICAL WASTE MANAGEMENT
EARTH



TEXTILE MANUFACTURING
CO-HAND



INFRASTRUCTURE INSPECTION
ARIES



HEALTHCARE
RODI



PLASTIC MANUFACTURING
QUARK



End-User Validation: From Prototype to Pilot

JARVIS
GA nº 101135708

12 industrial end-users · 81 operators and participants

	Prototype workshops (TRL 5-6) 4 large-scale pilots · 19 operators	Open Call pilots (TRL7) 8 pilots · 62 participants	Implication for deployment
Acceptance	Positive across all four use cases	**72–100%** of operators accept and would use the HRI solutions	**Operators tend to accept HRI once they understand it is designed around them**
Workload and ergonomics	Expected lower physical demand	**16–28% lower** workload and ergonomic risk reduction	**Operators welcome robots that take over strenuous and exposed tasks**
Usability and interaction	lower for novel XR/VR, where operators expect higher mental effort	**SUS 69–78** above-average usability, with room to improve	**Intuitive interfaces such as gestures and voice commands are adopted fast; XR/VR interfaces have a steeper learning curve and need training**
Trust and human role	Clear roles and manual override requested	**4.1 / 5** trust and safety where operators keep control	**Trust follows from keeping the human in control**

➢ ***Takeaway:*** *acceptance and physical relief* ***hold from prototype to pilot****;* ***interfaces and onboarding*** *are the next step to deployment.*

Lessons Learned & Next Steps

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Summary of AI-based capabilities in JARVIS

Workspace perception

Semantic scene understanding of parts, variants and anomalies

Human awareness

Human activity recognition and intent prediction

Multimodal interaction

Conversational and implicit interaction with personalised responses

Skill learning

Learning policies for skills execution from human demonstration

Task planning

AI-based problem formalisation and optimised task allocation

Adaptation

Reuse of parametrised skills, tuned to operator preferences

LESSONS FOR INDUSTRIAL DEPLOYMENT

AI stays at the robot cell

Industrial users want AI on-premise, close to the robot, rather than in the cloud

Real-time adaptation

Response time drives the user experience wherever the robotic system reacts to the human. Cloud AI better suits offline programming and tuning

Human oversight by design

Operators asked for manual override and clear human–robot roles. In response, functions let them trigger or validate the AI decision

Pre-trained AI: a trade-off

Pre-trained models cut the data each pilot must collect, but industrial precision still requires fine-tuning on representative data

➢ ***Next focus in the pilots:*** *higher* ***precision and robustness, representative industrial data*** *and* ***seamless cell integration****.*

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THANK YOU!

Zoi Arkouli

LMS



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