

Rodi - Robot supported disinfection of medical devices

Rodi is a safety-certified, human-in-the-loop two-cobot cell that automates the handling and preparation of contaminated surgical instruments, reducing staff exposure and ergonomic strain while stabilizing sterile processing throughput.

THE CHALLENGE AND WHY IT MATTERS

Sterile processing units must manually handle contaminated, sharp surgical instruments arriving unsorted, making preparation for washer-disinfection slow, unpleasant, and risky. The main challenges are reliable singulation, robust recognition of many reflective tools, and safe human-robot collaboration. Solving this reduces staff exposure and ergonomic strain, stabilizes instrument availability, and helps hospitals cope with skilled-labour shortages and operating-room schedule disruptions.

OUR SOLUTION AND VALUE PROPOSITION

The final Rodi prototype is a two-cobot cell validated in a sterile processing context: contaminated instruments are fed in trays, a first cobot separates disordered items using a magnetic gripper, and a second cobot recognizes and localizes each instrument, performs simple preparation (e.g., opening clamps/scissors), demagnetizes if required, and places instruments into target trays. The cell is protected via non-contact sensing implementing Speed and Separation Monitoring to enable safe human intervention for exceptions. Demonstrations validated the end-to-end workflow, human-robot interaction concept, and usability with operators. The concrete value is reduced direct contact with contaminated, sharp instruments and improved ergonomics for CSSD/AEMP staff, while helping hospital management stabilize throughput and instrument availability.

ADDED VALUE FROM JARVIS

Rodi used one JARVIS tool: Object Recognition (Classification) and Pose Estimation. It was integrated into the second cobot's vision pipeline to identify medical instruments, localize them, and derive stable grasp points for downstream handling and preparation. The added value was AI-based perception for diverse instruments, enabling more consistent pick-and-place performance and reducing the need for manual intervention.

KEY RESULTS

- ✓ KPI 1: TRL / maturity: Successful demonstration of the use case at TRL7
- ✓ KPI 3: Operator acceptance (KPI 3): >60% acceptance based on a user study with 6 users User survey (PE1): 80%
- ✓ KPI O1 (safety/health): 69% reduction of human exposure to harmful environments
- ✓ KPI O4 (ergonomics): OCRA Index improved from 11 to 6

POTENTIAL MARKET OPPORTUNITIES

First target customers are high-throughput hospital sterile processing units (CSSD/AEMP) in DACH, expanding next across Europe where workflows are similar. Later, the solution can be adapted to other medical reprocessing environments such as dental clinics and surgical preparation centres, and to additional geographies (e.g., North America) once technical robustness and deployment processes are standardized.



PILOT AT A GLANCE

Lead organization: MRK-Systeme GmbH
Consortium: UKA
Sector / use case: Medical
JARVIS module(s): Object recognition and pose estimation
Demonstration environment: University hospital Aachen

MORE INFORMATION

Website: <https://www.mrk-systeme.de/>
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Videos: <https://www.youtube.com/@JARVISHorizonEuropeProject>