JARVIS PILOT PROJECT OVERVIEW: REPAIR

Project name

REPAIR

Introduction

The RE-PAIR project aims to address challenges in Bonfiglioli's forklift axle remanufacturing process by incorporating enhanced vision systems and improving human-robot interaction. It will develop a robot-enhanced inspection station that utilizes advanced defect perception tools for real-time decision-making, ensuring accuracy and reliability, which are essential for effective collaboration with operators. The projected user interface directly on inspected components aims to facilitate intuitive interactions, yet this requires careful design to create a seamless user experience. The reconfiguration capability is designed to enable quick adjustments to the system, allowing it to perform the same tasks on different products with varying geometries and issues. By addressing these aspects through objective and traceable quality evaluation, RE-PAIR seeks to unlock new remanufacturing possibilities and contribute to ecological and economic benefits by minimizing waste and enhancing efficiency throughout the value chain.

Objectives

RE-PAIR will optimize the remanufacturing process of complex components by significantly reducing inspection time, assisting operators in identifying defects and granting objective reporting of the results to customers. Moreover, it will streamline the reconfiguration phase and shorten the time needed to adapt the system for new parts. To achieve these objectives, the project will: 1) Integrate and adapt robust AI-based visual anomaly detection. 2) Ensure accurate and efficient localization and pose estimation of parts, creating a clearly defined environment for the safe and effective execution of the robot's trajectory. 3) Validate an innovative human-robot interaction solution that utilizes AR projection for anomaly verification during the inspection phase and for proper robot placement when extending inspection capabilities to new components during the reconfiguration phase.

Key technologies or methods being developed or tested

The RE-PAIR project integrates a range of advanced technologies and methods to enhance the remanufacturing process of mechanical components through a collaborative inspection station. Key elements include **Robot-enhanced inspection process**, **Precise part localization and pose estimation**, **High-accuracy visual inspection**, **Dynamic camera path planning**, **Projection alignment and accuracy**, **Collaborative human-robot interaction**, **Reconfiguration capabilities.** These technologies and methods combined offer a comprehensive approach to optimizing the initial inspection phase in the remanufacturing workflow, enhancing both effectiveness and adaptability while addressing the complexities of modern manufacturing environments.

Description of consortium implementing the project.

The coordinator, Deep Vision Consulting, is a high-tech company in the field of computer vision and deep learning. With its extensive knowledge in sensors, image processing, embedded cameras and software for computer vision applied to robotics, DVC is the technology provider of the solution

The end user Bonfiglioli is a leading global player of mechanical power transmissions for mobile off-highway machines. The 70 years experience in the design of wheel drive systems and the advanced manufacturing footprint, make Bonfiglioli the ideal partner for testing the REPAIR innovative automation solution for the emerging process of remanufacturing.