ARTWORK

Helping workers to build customised products more efficiently

Utilising digital twins of factory workers and equipment, smart instruction generation and a worker feedback system, the ITEA project ARTWORK (smART and connected WORKer) will develop a real-time assistance system to connect workers to the production line and enable automatic, context-based derivation of process instructions.
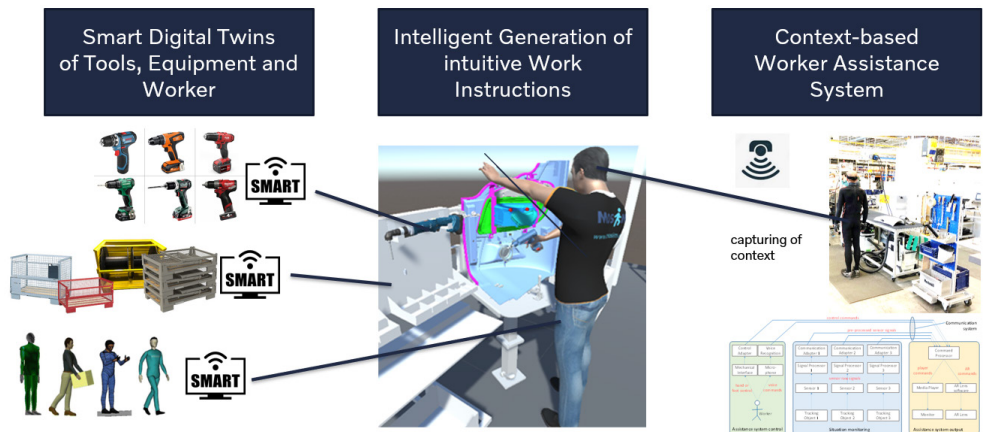
Addressing the challenge

In European plants, many employees work with their hands on complex, individualised products. A flexible production system is required to deal with numerous variants, but model creation and feedback remain mostly manual and the simulation and evaluation of variants is costly and time-consuming. The most flexible resources are the workers, yet IoT is mainly focused on equipment automation. Although sensors for capturing tools or parts of workplace exist, there is no integrated toolchain focusing on manual assembly workplaces.

Proposed solutions

To achieve this, ARTWORK will develop a real-time, context-aware assistance system for workers. First, the simulation of manual workstations will be enabled by combining digital twins for tools and equipment with digital twins of workers. The integration of real sensor data will allow real-time simulation of digital twins for advanced monitoring and adjustment of instructions in response to behaviour. A targeted digital twin database will be the foundation for evaluation and integration at other companies. Second, smart instruction generation will be derived using an automatic reasoning engine and a set of ground knowledge on processes, tools and task sequences that cannot be directly reasoned from product structure and geometry. Finally, a worker feedback system will link the combined product models and production process models with real-time measurement data

from sensors. Screens and augmented reality solutions will provide information to workers while user input based on natural speech recognition and gesture recognition will provide a user-friendly interface.

from an incorrect task order without human consultation. This creates trust in the system and a more enjoyable work environment while targeting a >50% reduction in qualification time.

The consortium views open-source software development as the best way to promote their work and the project's results will therefore be integrated into the IT infrastructure and toolchains of end-users using open code. In the longer term, the use of standards and the global drive for lower operating costs will lead third parties to contribute to the

Smart Digital Twins of Tools, Equipment and Worker	Intelligent Generation of intuitive Work Instructions	Context-based Worker Assistance System

Projected results and impact

If implemented in full, ARTWORK ultimately expects to provide a 10-30% increase in a factory's first-time through. This will be achieved via various improvements on the state of the art, including a 30% reduction in instruction preparation time when changing stations and a 10-20% improvement in the tracking and localisation accuracy of vision-based technology. For workers, the bi-directional system will allow them to utilise their expertise to optimise instructions and processes during assembly and assist them in recovering

toolchain, enabling the creation of a new market of products and services and the integration of ARTWORK into critical production domains that push European industry forward.

Project partners

Sweden

Atlas Copco

FRAUNHOFER CHALMERS
RESEARCH CENTRE FOR INDUSTRIAL MATHEMATICS

INFOTIV

LULEÅ
UNIVERSITY
OF TECHNOLOGY

CHALMERS
INDUSTRITEKNIK

VOLVO
VOLVO GROUP

CHALMERS
UNIVERSITY OF TECHNOLOGY

xarepo

Germany

DAIMLER TRUCK
Daimler Buses

DFKI
Deutsches
Forschungszentrum
für Künstliche
Intelligenz GmbH

ifak

TWT GmbH
Science & Innovation

University of Applied Sciences
HOCHSCHULE
EMDEN·LEER

Portugal

isep Instituto Superior de
Engenharia do Porto

load

WISEWARE
ENGINEERED SOLUTIONS

JVC-INDÚSTRIA
DE CONFECÇÕES LDA

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Project leader
Kristofer Bengtsson, Volvo

Project website
https://itea4.org/project/artwork.html

Project end
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Project email
kristofer.bengtsson@volvo.com

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