R5-COP

Reconfigurable ROS-based Resilient Reasoning Co-operating Robotic Systems

ARTEMIS

PROJECT *description*

R5-COP focuses on agile manufacturing paradigms and specifically on modular robotic systems. Based on existing and newly developed methods for the formal modelling of hardware and software components, R5-COP will support model-based design, engineering, validation and fast commissioning.

RELEVANCE CALL *2013 objectives*

R5-COP addresses the ARTEMIS sub programmes:

> ASP4 "Embedded Systems for manufacturing and process automation"
> ASP1 "Methods and processes for safety-relevant Embedded Systems"
> ASP5 "Computing platforms for Embedded Systems"
> plus aspects of ASP8 "Human-centred design of Embedded Systems"

MARKET *innovation*

European manufacturing industry faces increasing demand for high product variance, small product series, shorter production cycles and cost reduction. However, few robotic components are designed for easy adaptation and reuse. R5-COP focuses on agile manufacturing paradigms and specifically on modular robotic systems to overcome these shortcomings, by identifying and extending suitable existing methods and, where required, developing new ones to formally model hardware and software components. This approach will support model-based design, engineering, validation, and fast commissioning. Furthermore, by using existing interface and middleware standards such as ROS, R5-COP will strongly facilitate integration of components from various suppliers.

TECHNICAL *innovation*

R5-COP aims to enable industrial-scale fast, flexible adaption by robots to quickly changing environments and safe, direct human/robot cooperation and interaction by:

> Enabling fast and flexible re-composition of software and hardware components of robotic systems, while ensuring robust and safe operation.
> Enabling standardised yet simple design and implementation of software components, by using ROS Industrial for software deployment and SDKs for software development.
> Enabling standardised yet flexible (re)configuration, using ontologies of configurable components for hardware and application modelling.
> Ensuring robust perception, using advanced reconfigurable sensor systems modules.
> Supporting component and system certification for safe human/robot cooperation.
> Identifying, modelling, developing and evaluating key hardware and software components, using dedicated use-cases from industrial and service domains.
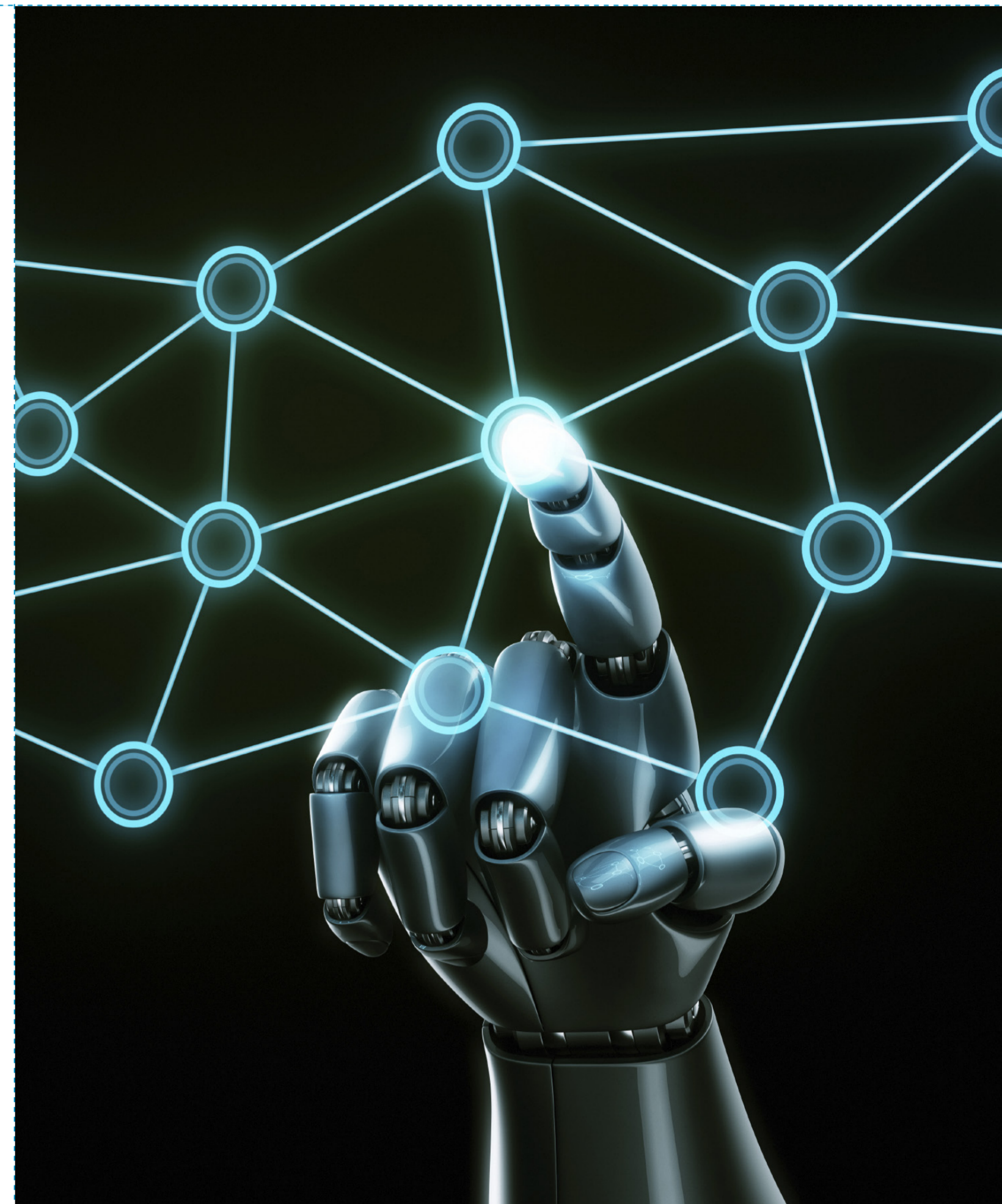
R5-COP

PROJECT COORDINATOR Rainer Buchty	**START** 1 February 2014
INSTITUTION TU Braunschweig	**DURATION** 36 months
EMAIL buchty@c3e.cs.tu-bs.de	**TOTAL INVESTMENT** € 13.02 M
WEBSITE www.r5-cop.eu	**PARTICIPATING ORGANISATIONS** 30
	NUMBER OF COUNTRIES 12

NORWAY
NTNU – Trondheim Norwegian University of Science and Technology
SINTEF
Statoil

SWEDEN
LULEÅ UNIVERSITY OF TECHNOLOGY
SSC

FINLAND
PROBOT
TEKNOSAVO
SIIPOTEC
profin Doors & Windows
VTT

DENMARK
DANISH TECHNOLOGICAL INSTITUTE
MiR Mobile Industrial Robots

THE NETHERLANDS
ALTEN
SAXION University of Applied Sciences
HOGESCHOOL UTRECHT
ROBOMOTIVE Turnkey Robotics & Production Automation
TU/e Technische Universiteit Eindhoven University of Technology

LATVIA
Latvijas Universitātes Matemātikas un informātikas institūts

POLAND
PIAP

CZECH REPUBLIC
BRNO UNIVERSITY OF TECHNOLOGY
camea image & signal processing

SPAIN
EMTE
tecnalia Inspiring Business

GERMANY
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