**Federal Ministry
for Economic Affairs
and Energy**

AUTONOMIK
INDUSTRIE 4.0

AUTONOMICS
for Industry 4.0

AUTONOMIK für Industrie 4.0

In the years to come, the highly flexible production of individual, digitally enhanced products and services will make its way into industry. Value added processes will change and new business models will arise. Germany's economy will have to take up this challenge in order to expands its current leading position. Industry 4.0, the so-called fourth industrial revolution, is the key to this change.

„Industry 4.0" describes the link between components and machines in the physical world and the communication possibilities offered by the Internet. Workpieces will have electronic intelligence paired with an electronic memory. They carry with them the information about the required processing steps and independently activate processing jobs. Smart machines co-ordinate their handling and trigger the supply of the materials required. Industry 4.0 technologies are the foundation for a new quality in production networks and value chains across companies and borders, for new methods in the development and design of new products and services, as well as for the creation of new business models.

With its Industry 4.0 Future Project, the federal government has launched a new focus for its technology policy. The technology programme AUTONOMIK für Industrie 4.0 (in English: AUTONOMICS for Industry 4.0) by the Federal Ministry for Economic Affairs and Energy (BMWi) is going a long way to ensure the success of this endeavour. 14 projects involving around 100 partners from industry and academia have qualified for support by the Federal Ministry which is backing the projects with funding in the order of €40m. Scientific assistance measures will also address important cross-cutting issues related to IT security, law and standards, as well as the future of work in Industry 4.0.

APPsist
Smart assistance systems in production

The APPsist project is developing a holistic approach for man-machine interaction in production. Based on the specific expertise of employees, software-based assistance systems will automatically adapt to meet the need for support among these employees. In this way, support and learning processes can be developed to meet very different needs, such as commissioning, operation, maintenance and repair, as well as preventive servicing of systems. With made-to-measure support like this, employees with different levels of knowledge can be assigned a wider range of tasks than before.

www.appsist.de

Info: Klaus Herrmann (herm@de.festo.com),
Festo Lernzentrum

Partners:
Festo Lernzentrum Saar GmbH (consortium leader), Brabant & Lehnert GmbH, DFKI-Deutsches Forschungszentrum für Künstliche Intelligenz, Festo AG, Fraunhofer AIO, imc information multimedia communication AG, MBB Fertigungstechnik GmbH, Ruhr-Universität Bochum

---

CoCoS
Plug&play networking in production

CoCoS is developing a smart information and communication infrastructure with the ability to both recognise the different components of a production line, such as machines and workpieces, and to network them with each other. CoCoS is also designed to form a communication bridge

between the production, logistics and other management systems used. Separate networking of independent production systems at different locations is also to be enabled. No in-depth skills will be required, neither for commissioning the production line nor for any necessary adjustments.

www.cocos-project.de

Info: Dr. Patrick Nickel
(Patrick.Nickel@de.bosch.com), Robert Bosch GmbH

Partners:
Robert Bosch GmbH (consortium leader), DFKI-Deutsches Forschungszentrum für Künstliche Intelligenz GmbH, DMG Electronics GmbH, trustsec IT-Solutions GmbH, TU Berlin, XETICS GmbH

FTF out of the box
Autonomous, driverless transport vehicles with voice and gesture-based man-machine interaction

FTF out of the box is developing smart, driverless transport vehicles which, after delivery, can immediately find their way around the factory hall, remember their surroundings and can be assigned transport jobs, for instance, simply using voice and gesture commands. Previous systems required long and difficult learning and reconfiguration phases, such as the prior implementation of a location map and the installation of artificial landmarks. Significant savings are now possible for customers.

www.ftf-out-of-the-box.de

Partners:
Jungheinrich AG (consortium leader), Basler AG, Götting
KG, Universität zu Lübeck, IPH - Institut für Integrierte
Produktion Hannover gGmbH

GEMINI
Business models for Industry 4.0

The aim of the GEMINI project is to develop viable new
business models within the context of Industry 4.0. The
toolkit developed in GEMINI is enabling participating com-
panies and organisations to develop and efficiently imple-
ment individual business models using IT tools and an
online platform. A template-based approach makes it easier
to develop business models while potential risks can be
assessed efficiently and reduced. An operationalisation
planner ensures that the business model developed is inte-
grated into the company's value chain, thus ensuring the
successful introduction of the principles of Industry 4.0.

www.geschaeftsmodelle-i40.de

Partners:
Universität Paderborn (consortium leader), Atos IT Solutions
and Services GmbH, CONTACT Software GmbH, Fraunhofer
IPT, Ruhr-Universität Bochum, SLM Solutions GmbH,
UNITY AG

InnoCyFer

Customised design and production of products with bionic planning and control methods

The InnoCyFer project is developing a web-based open-innovation platform which provides customers with a toolkit that allows them to design technically viable products individually and according to their own ideas without the need for specific skills. Unique new autonomous production planning and control methods are developed to manufacture these custom-innovated products. The methods are based on flexible and adaptive forms of organisation found in biology. In this way, jobs can be planned at short notice and change requests can be accepted late in the production process.

www.innocyfer.de

Info: Ulrich Teschemacher (Ulrich.Teschemacher@iwb.tum.de), TU München

Partners:
TU München (consortium leader), BSH Bosch und Siemens Hausgeräte GmbH, Festo Didactic GmbH & Co. KG, Fraunhofer IWV, HYVE Innovation Community GmbH

InSA

Protection and safety concepts for co-operation between humans and robots in joint working areas

In the InSA project, previously independent work areas of workers and robot systems in production are monitored using sensor technology in order to co-ordinate safety measures. The system records all current activities and, tak-

ing the context and respective situation into account, assesses the risk potential which workers, for instance, could be exposed to due to robot movements. The aim of this project is technical standardisation of these context-orientated protection systems and their integration into smart production environments, so that the economic efficiency of industrial robots in mixed working environments can be improved.

www.insa-projekt.de

Info: Prof. Dr. Michael Lawo (m.lawo@neusta.de), neusta mobile solutions GmbH

Partners:
neusta mobile solutions GmbH (consortium leader), Hubert Schmitz GmbH, ThyssenKrupp System Engineering GmbH, Universität Bremen

InventAIRy

Stocktaking in warehouses with autonomous flying robots

The aim of the InventAIRy project is to develop a system for automatic location and stock-taking of warehouse stocks using autonomous flying robots. The sensors used ensure that the system can independently detect and analyse its environment so that it can navigate its way through the warehouse, detect logistics objects and perform stock-taking. The system is to be used for both indoor and outdoor warehouses and can be easily networked with legacy warehouse management systems.

www.inventairy.de

Info: Prof. Dr. Michael ten Hompel
(michael.ten.hompel@iml.fraunhofer.de), Fraunhofer IML

Partners:
Fraunhofer IML (consortium leader), Aibotix GmbH, Panopa Logistik GmbH, Rheinische Friedrich-Wilhelms-Universität Bonn, Spedition Wiedmann GmbH & Co . KG

MANUSERV

From the manual process to the industrial service robot

The MANUSERV project aims to develop a planning and decision-making support system that uses service robots in order to automate processes that have been carried out manually up to now. The aim is to secure both technical viability as well as economic feasibility. The system provides support when it comes to selecting the most suitable service robot and its programming, right through to virtual commissioning. The solution is to be provided as a service for users via an internet plat-

form where suppliers will offer their service robot solutions in a technology catalogue which will also contain technical descriptions of the abilities of the products and robots.

www.manuserv.de

Info: Frank Heinze, RIF e.V. (Frank.Heinze@rt.rif-ev.de)

Partners:
RIF e. V. - Institut für Forschung und Transfer (consortium leader), Albrecht Jung GmbH & Co. KG, KHS Corpoplast GmbH, GEA Farm Technologies GmbH, Icarus Consulting GmbH

---

motionEAP
Greater efficiency and assistance for production processes

The aim of the motionEAP project is to design, prototype and evaluate an assistance system for workplaces in industrial production processes. The system is to help integrate impaired workers into production processes and to secure their jobs. The idea is to automatically record and evaluate activities at the workplace. In the case of errors or risks, the system will intervene and guide the worker.

www.motioneap.de

Info: Klaus Klein (klaus.klein@audi.de), Audi AG

Partners:
Audi AG (consortium leader), BESSEY Tool GmbH & Co. KG, GWW GmbH, Hochschule Esslingen, KORION GmbH, Robert Bosch GmbH, Schnaithmann Maschinenbau GmbH, Universität Stuttgart

OPAK
3D-supported engineering platform for intuitive development of production plants

The OPAK project focuses on the development of a 3D-supported engineering platform for intuitive planning, development and commissioning of production plants. The plant can be initially planned, independent of the manufacturer, based on purely functional descriptions of the standard components of the automation system. The final components with the specific performance characteristics of the respective supplier are not added until later.

www.opak-projekt.de

Info: Johannes Hoos (hojo@de.festo.com), Festo AG

Partners:
Festo AG & Co. KG (consortium leader), ASYS Automatisierungssysteme GmbH, elrest Automationssysteme GmbH, Festo Didactic GmbH & Co. KG, fortiss GmbH, Hochschule Ostwestfalen-Lippe, 3S-Smart Software Solutions GmbH

ReApp
Reusable robot apps for SMEs

ReApp defines standardised interfaces for integrating hardware and software from different manufacturers for robot systems. Together with a catalogue of reusable smart services (robot apps), robot systems will be adapted faster and

at less cost to the specific requirements of small and medium-sized enterprises (SMEs). In this way, SMEs are able to make flexible and economic use of robot systems in production, assembly and logistics.

www.reapp-projekt.de

Info: Dr. Ulrich Reiser (Ulrich.Reiser@ipa.fraunhofer.de), Fraunhofer IPA

Partners:
Fraunhofer IPA (consortium leader), BMW AG, Dresden Elektronik Ingenieurtechnik GmbH, Fischer IMF GmbH & Co. KG, Fluid Operations AG, fortiss GmbH, FZI Forschungszentrum Informatik, Industrielle Steuerungstechnik GmbH, InSystems Automation GmbH, Karlsruher Institut für Technologie KIT, Ruhrbotics GmbH, Sick AG

SMART FACE
Distributed production control for the automotive industry

The aim of SMART FACE is to develop distributed production planning and control systems. This is designed to adapt manufacturing structures to small-series production; parts to be assembled are individually requested via a server-based application and self-organised machines distribute their workloads, making central workflow planning unnecessary. The advantages of this approach are flexibility, easy adaptation and an improved response to unforeseen changes in the workflow.

www.smartfactoryplanning.de

Partners:
Logota Digital Solutions GmbH (consortium leader),
Continental Teves AG & Co. OHG, FLS FUZZY Logik
Systeme GmbH, Fraunhofer IML, Lanfer Automation
GmbH & Co. KG, Sick AG, Technische Universität Dort-
mund, VOLKSWAGEN AG

SMARTSITE
Autonomous and networked construction machines in road construction

SMARTSITE develops smart control systems for autono-
mous construction machines that are also capable of
co-operating in a team. A model motorway construction
site is being viewed as an application case where a control
centre sends the work jobs to the construction machines
and provides additional information, for instance, regard-
ing environmental conditions. The development of uni-
form standards for exchanging data and providing infor-
mation outside the scope of the construction site are
important aspects of this project. The overall goal is to sig-
nificantly improve the efficiency of road construction and
the quality of the roads built, especially with a view to
longer durability.

www.smartsite-project.de

Partners:
Drees & Sommer Infra Consult und Entwicklungsmanagement GmbH (consortium leader), Ammann Verdichtung GmbH, ceapoint aec technologies GmbH, Ed. Züblin AG, Topcon Deutschland GmbH, Universität Hohenheim

---

SPEEDFACTORY
Automated custom manufacturing of sports goods and seat covers

Automated custom production is being developed in the SPEEDFACTORY research project where humans and machines work together in a common working environment to produce sports goods and car seat covers in the shortest possible time, from the design to the final product at low cost and in a flexible manner.

Info: Jan Hill (Jan.Hill@adidas.com), adidas Group

Partners:
adidas AG (consortium leader), fortiss GmbH, Johnson Controls GmbH, PFAFF Industriesysteme und Maschinen GmbH, RWTH Aachen

Imprint

Zertifikat seit 2002
audit beruf**und**familie