# PRESS RELEASE

## AI research for tomorrow’s production

### it’s OWL presents new approaches at the Hannover Messe

**Hannover, 12 February 2020. Intelligent production and new business models: Artificial intelligence is of crucial importance for the competitiveness of industry. In the Leading-Edge Cluster it's OWL, six research institutes work together with more than 100 companies to develop practical solutions for small and medium-sized businesses. At the OWL joint stand (Hall 7, A12), over 40 exhibitors will demonstrate applications in the areas of machine diagnostics, predictive maintenance, process optimisation and robotics.**

Prof. Dr. Roman Dumitrescu (Managing Director it's OWL Clustermanagement GmbH and Director Fraunhofer IEM) explains: "Our research institutions are international leaders in the fields of machine learning, cognitive assistance systems and systems engineering. At our four universities and two Fraunhofer Institutes, 350 researchers are working on over 100 projects to make artificial intelligence usable for applications in industrial value creation. With it's OWL, we bring this expert knowledge into practice. In 2020, we will launch three new strategic initiatives worth 50 million euros to unlock the potential for AI in production, product development and the working world for small and medium-sized enterprises.

In the initiative 'AI Marketplace', for example, 20 research institutions and companies are developing a digital platform for artificial intelligence in product development. Here, providers, users and experts can network and develop solutions. In the competence centre 'AI in the working world of industrial SMEs', 25 partners from industry and science make their knowledge of work structuring in the context of AI available to companies.

**Learning machine diagnostics and 'SmartBox' for process optimization**

The Institute for Industrial Information Technology at the OWL University of Applied Sciences and Arts will present new results for intelligent machine diagnostics at the trade fair. Using a three-phase motor, it will be illustrated how learning algorithms and information fusion can be used to reliably identify, predict and visualise states of technical systems. Patterns and information hidden in time series signals are learned and presented to the user in an understandable way. Inaccuracies and uncertainties in individual sensors are solved by conflict-reducing information fusion. For example, motors can be used as sensors and, within a network of sensors and other data sources in production plants, they can measure the "state of health" and analyse the causes of malfunctions via AI. This reduces scrap and saves up to 20 percent in materials.

The 'SmartBox' of the Fraunhofer IOSB-INA in Lemgo is a universally applicable solution that identifies anomalies in processes in various production environments based on PROFI-NET data. The solution requires no configuration and learns the pro-cess behaviour. Numerous companies have already successfully tested the 'Smart-Box' in the automotive, logistics and production sectors. The applications showed that the productivity of a plant can be increased by between five and eight percent and that the costs for identifying production defects can be reduced considerably with the Fraunhofer solution.

With retrofitting solutions of the Fraunhofer Institute, companies can make machines and systems in their inventory fit for Industrie 4.0 applications without major investment expenditure. The spectrum ranges from mobile production data acquisition systems in suitcase format for potential studies to permanently installable retrofit solutions. Intelligent sensor systems, cloud connections and machine learning methods for data analysis present the basis for data analysis. This way, processes can be optimised and more transparency, control, planning, safety and flexibility in production can be achieved. At the Hannover Messe, Fraunhofer IOSB-INA is showing a retrofitting application with a

30-year-old drill press. The recorded production data is visualised by an additional application for human-machine-interaction.

**Cognitive robotics and self-healing in autonomous systems**

The Institute of Cognition and Robotics (CoR-Lab) presents a cognitive robotics system for highly flexible industrial production. The potential of model-driven software and system development for cognitive robotics is demonstrated by using the example of automated terminal assembly in switch cabinet construction. For this purpose, machine learning methods for environmental perception and object recognition, automated planning algorithms and model-based motion control are integrated into a robotic system. The cell operator is thereby enabled to perform different assembly tasks using reusable and combinable task blocks. To do this, he does not need to know the details of the software and hardware with which the task is implemented. Methods are easily transferable to other applications of robot-assisted assembly and to machine loading and unloading.

The research project "AI for Autonomous Systems" of the Software Innovation Campus Paderborn aims at achieving self-healing properties of autonomous technical systems based on the principles of natural immune systems. For this purpose, anomalies must be detected at runtime and the underlying causes must be independently diagnosed. Based on the localisation it is necessary to plan and implement behavioural adjustments to restore the function. In addition, the security of the systems must be guaranteed at all times and system reliability must be increased. This requires a combination of methods of artificial intelligence, machine learning and biologically inspired algorithms. Areas of application include smart factories, autonomous driving or unmanned aircraft. At the OWL joint stand, visitors can experience how a machine can independently detect malfunctions in the operating process and initiate self-healing measures at a demonstrator.

**Process optimisation and value networks**

A model factory of the Center for Applied Data Science (CfADS) at Bielefeld University of Applied Sciences shows how artificial intelligence provides solutions for optimising the value chain. The factory demonstrates how components that are to be manufactured into products with different characteristics and a different depth of production in the factory are fed into the production cycle and outsourced so that the overall production time is minimised. In doing so, new customer requests are reacted to dynamically and further restrictions, such as the respective delivery date, are taken into account. The optimisation of the value chain in the model factory is based on event-discrete models, which are used to derive a systematic control design. The control system represents the interface between the physical level and the AI level. A supervisor coordinates the commands between the AI level and the control level.

In addition, CfADS will present a washstand from Bio-Circle Surface Technology GmbH, thus demonstrating how the implementation of a cloud-based service for the intelligent embedding of IoT devices in existing business processes can be shown. The use and filling of the washstand with liquid (cleaning agent) is simulated within the exhibit. The data sent from the washstand is processed on an ML/application server and visually processed via a web application.

**Predictive maintenance and digital twin**

As part of the BOOST 4.0 project, the largest European initiative for Big Data in industry, it's OWL is working with 50 partners from 16 countries on various application scenarios for Big Data in production. In a production line of the automotive supplier BENTELER, the focus is on predictive maintenance: Thanks to the systematic collection and evaluation of machine data from a hydraulic press and a material conveyor system, it is possible to identify patterns in the production process. The Fraunhofer IEM has developed a process model for the implementation of predictive maintenance using intelligent algorithms. With success: In the last two years, the prediction of machine failures has been significantly improved by machine learning methods. The mean time to repair has

so far been reduced by more than 30%, a further reduction of 30% is expected. The number of machine failures has also been significantly reduced. The mean time between failures is now six times longer than before. In addition, it is expected that the overall plant efficiency can be increased by 5% by the end of the project. A model of the production line will enable trade fair visitors to follow data acquisition, data streams and the functioning of data analytics.

The digital twin is an important prerequisite to increase the potential for efficiency and productivity in all phases of the machine life cycle. Companies and research institutes are working on the technical infrastructure for digital twins in an it's OWL project. Digital descriptions and sub-models of machines, products and equipment as well as their interaction over the entire life cycle are now accessible thanks to interoperability. Requirements from the fields of energy and production technology as well as existing Industrie 4.0 standards and IT systems are taken into account. This is expected to result in potential savings of over 50 percent. At the joint stand, Lenze and Phoenix Contact will use typical machine modules to demonstrate how digital twins can be used to exchange information between components, machines, visualisations and digital services across manufacturers. Interoperability proves for the first time how the combination of data can be used to create useful information with added value for different user groups. For example, machine operators and maintenance staff can detect anomalies and receive instructions for troubleshooting.

Further information and pictures at http://www.its-owl.com/hannovermesse

**The Leading-Edge Cluster it's OWL**

In the Technology Network it's OWL - Intelligent Technical Systems OstWestfalenLippe.Germany, more than 200 companies, research institutes and organisations develop solutions for intelligent products and production processes. To this end, projects worth 200 million euros are to be implemented by 2023. An innovative transfer concept makes new technologies available to small and medium-sized companies. Named as one of the Leading-Edge Clusters by the Federal Ministry of Education and Research, it's OWL is considered to be one of the largest Industrie 4.0 initiatives for SMEs. and contributes to securing production in Germany.

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