PRESS RELEASE

New AI applications for SMEs in Baden-Württemberg

Fraunhofer IPA is participating in three separate projects which have emerged victorious in the Baden-Württemberg "AI Innovation Competition". The project partners will be spending the rest of this year developing AI-based applications to address needs identified in the areas of process monitoring, machine operation and beverage logistics.

As far as Artificial Intelligence (AI) is concerned, Fraunhofer IPA has enjoyed a successful start to 2021: The institute is involved in 3 out of a total of 44 projects backed by the Ministry for Economic Affairs, Labor and Housing for the state of Baden-Württemberg within the framework of its "AI Innovation Competition". The aim of the projects and of the competition overall is to overcome technological obstacles in the commercialization of AI, and to put methods which use AI into practice.

Together with small and medium-sized enterprises (SMEs) from the region, the IPA researchers are developing new, AI-based procedures for a variety of application cases. These include more efficient process monitoring of systems, transforming machines into self-teaching applications, and the automation of beverage logistics.

Virtual sensors for process monitoring: ViSKI

Until now, integrating high-resolution sensors for process monitoring in manufacturing plants has always been an expensive and time-consuming process. Low-resolution sensors, which are integrated into the machines within the process environment by way of rechargeable battery packs, and which can provide readings using wireless interfaces such as Bluetooth, present an alternative. However, as these do not provide a sufficient quality or quantity of data for individual follow-up applications, the research projects are working on virtual sensors. These are aimed at raising the quality and quantity of data generated by the low-resolution sensors to the level seen with high-resolution sensors using neural networks, i.e. machine learning methods. The current focus of the project is on wood machining. The project partners are keen to incorporate the technology into further SME-typical sectors such as metal processing and mechanical engineering at a later date.

Self-learning and self-explanatory machines for intuitive machine operation: SLEM

It is often the case that experts are needed for the installation, maintenance and reconfiguration of machines. Therefore, this project aims to develop an assistance system that enables all employees to operate a machine, even without extensive prior experience. Using AI-based analysis of sensor and internal machine data, the device is able to recognize the machine status and the operator's intention. A further AI module, which uses machine learning processes, develops logical operating options using the conflated data. The machine recognizes when the user is operating it incorrectly and is able to alert him or her. The goal of the project is to turn every machine into a self-learning and self- explanatory system component. A leveling machine and filling machine serve as initial prototypes.

Robotic warehouse workers for beverage logistics: Luka-Beverage

Hauling drinks crates here, there and everywhere is evidently going to take a physical toll and is far from an ergonomic task – especially when it forms part of someone's daily work. With an estimated 530 million drinks crates in circulation around Europe, there are plenty of ways we can help here. This is why the project partners of "Luka-Beverage" are working on a service robot to help with this task. However, the dynamic, narrow and unstructured environments like those found in beverage warehouses pose a challenge when finding an automated solution. Moreover, service robots have so far only been able to lift weights of up to 20 kg on rare occasions.

Therefore, the aim of the project is to develop a suitable gripping system for the mobile platform "Luka", which was developed by the company Mojin Robotics and already exists as a prototype. Using AI processes for object localization, the robot knows exactly where the crates and bottles are located, even in such a challenging environment. With this knowledge, it is able to plan how to grip these objects. In addition, a 3D navigation system is created, thanks to which the robot can find its way around autonomously and also partially creates a 3D map of the free workspace. As a result, the robot and its arm can move around in a collision-free manner, even without a sensor to alert it to potential obstacles. The aim of the project is, by the end of this year, to develop the prototype so that it uses sensor-guiding technology in order to carry out palletizing and depalletizing tasks in addition to being able to stack crates of drinks and handle empty bottles. In so doing, this would illustrate the technical and economic viability of automated solutions such as "Luka".

Project overview

Duration:
January 01, 2021 to December 31, 2021

Funding:
The projects ViSKI, SLEM and Luka-Beverage are funded by the Ministry for Economic Affairs, Labour and Housing for the state of Baden-Württemberg as part of the Baden-Württemberg AI Innovation Competition.

Project ViSKI
– Full title: ViSKI – Virtual sensors using AI for smart process monitoring using wood machining as an example
– Additional partners: scitis.io GmbH (Stuttgart), Atemag Aggregattechnologie und Manufaktur AG (Hofstetten)

Project SLEM
– Full title: SLEM – self-learning and self-teaching machines
– Additional partners: Knowtion GmbH (Karlsruhe), Sabo Mobile IT GmbH (Bühl)

Project Luka-Beverage
– Full title: Luka-Beverage – an AI-based mobile handling assistant for beverage logistics
– Additional partners: Node Robotics GmbH (Stuttgart), Ensinger Mineral-Heilquellen GmbH (Vaihingen an der Enz), aktiv-markt Manfred Gebauer GmbH (Göppingen), Mojin Robotics GmbH (LeinfeldenEchterdingen)

One of the projects funded by the AI Innovation Competition is developing technology for robotic-based gripping of beverage crates.
Source: Mojin Robotics/Photo: Felix Bezler.

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