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## Technological Quantum Leaps Are Creating New Application Possibilities

automatica 2018: Machine vision in transition

**Machine vision is currently redefining itself and becoming increasingly integrated with other automation disciplines. Quantum leaps in technology continue to lead to sharp increases in performance and are opening up possibilities for new applications. As a result, the machine vision industry is creating the basis for human-robot collaboration and digital transformation in production. automatica 2018, in Munich from June 19 to 22, provides the ideal platform to learn about the latest developments in this innovative segment.**

Machine vision is constantly opening up new fields of use for automated processes in almost all areas of industrial production. “The technology is moving more and more from solving individual problems toward becoming an integral part of the automation,” Dr. Norbert Stein, CEO of Vitronic GmbH, stated. “The integration of optical information in more and more production steps and systems leads to an increase in achievable quality and a decrease in the consumption of resources thanks to early fault detection and trend analyses.”

This development is clearly reflected in current market data VDMA—Professional Association of Robotics + Automation: 2016, the German machine vision industry was able to increase its sales by 9 percent to a record amount of 2.2 billion euros. For 2017, the trade association even expects further revenue growth of 18 percent and industry sales of 2.6 billion euros according to the current state of affairs.

Dr. Olaf Munkelt, Managing Director MVTec Software GmbH and Chairperson of the VDMA Department Industrial Machine Vision (IBV), cites export as the driver of this positive development with an average growth rate of 13 percent per year between 2012 and 2016 on the one hand and the automotive industry on the other hand: “It has already taken advantage of machine vision for years as its strongest customer base worldwide, but many other industries have also recognized the potential of this technology in the meantime and use it increasingly.”

Numerous technical trends are currently resulting in drastic changes in machine vision and industrial production. Buzzwords such as digital transformation in manufacturing, production assistance systems, the increased merging of automation and machine vision, robot vision,

embedded vision, deep learning and 3D machine vision are currently shaping developments.

According to Christof Zollitsch, Managing Director of Stemmer Imaging AG, machine vision represents a key technology for implementing digital transformation in automation. "Machine vision and automation technology are currently growing together even closer partly due to the implementation of the OPC UA standards, among other things. This standard ensures problem-free communication and interoperability within an overall system. Insofar, it is only logical that many automation suppliers are dealing more intensively with machine vision."

### **Megatrend Embedded Vision**

Compact embedded machine vision systems, which are integrated directly into machinery or equipment based on simple camera modules, are among the current hot topics in the industry. With the help of powerful computer platforms with low power consumption, they provide intelligent machine vision in a variety of applications. The automotive sector is considered the most promising application area for embedded vision due to the large number of pieces. The technology is already used in many modern car models, among other things, in the form of driver assistance systems.

Although the majority of all embedded vision applications cannot be found in industrial production, it is worthwhile for automation engineers to keep an eye on this technology. On the one hand, such systems, for example in the automotive industry, have to be integrated into vehicles and therefore require appropriate processes; on the other hand, automation technology can also benefit increasingly from the performance gains of this cost-effective technology.

### **Deep learning for increased efficiency**

Another important trend is currently the topic of deep learning. In the machine vision context, this refers to methods of machine learning, in which a system is trained often using thousands of good and bad images to allocate checked objects automatically to learned categories and, for example, to be able to decide on the quality of the inspected parts. As a result, users can solve various classification tasks without the tedious manual adjustment of operators.

Among other places, application examples can be found in the electronics industry where testing processes can be automated and accelerated further, in that all possible product defects are learned via a self-learning process and then detected. Even the smallest scratches or cracks in printed circuit boards, semiconductors and other components can be found reliably and defective parts are automatically rejected. These procedures are also used in the automotive industry, for example, to identify tiny paint damage reliably, which cannot be seen with the naked eye, with the help of self-learning algorithms. In the pharmaceutical industry, deep learning enables reliable classification of outwardly similar tablets with different active ingredients. This increases the safety of patients who rely on these drugs.

### **3D and ease of use**

Machine vision systems that work with three-dimensional data of test objects represent another interesting field that has strongly developed for years and has succeeded in making the transition into practical applications in the meantime. This trend is also confirmed by current market figures of the VDMA, which show a substantial sales increase of 28 percent in the field of 3D applications and products from 2015 to 2016.

Growing automation requirements such as bin picking or many pick & place applications can only be realized with 3D machine vision. Compact and robust 3D cameras enable increasingly easier integration of this technology. Supplementary object information such as movement data and color information as well as the combination with 2D methods will further expand the applications of 3D imaging in the future.

Given the many technical developments, the aspect of ease of use should not be neglected. It should be possible for users, who are not experts in machine vision, to operate future vision systems. This demand for more "ease of use" applies to simple systems, smart cameras and vision sensors as well as to PC-based machine vision systems.

"Current technological development is more or less leading to an automation of automation," Enis Ersü, CEO of ISRA VISION AG, stated: "The systems are becoming more powerful and can be operated intuitively even without expert knowledge at the same time. Future-oriented machine vision systems, embedded in smart sensor networks, adapt to changing tasks." According to Mr. Ersü, the resulting data are "crucial for flexible process and production adjustment that the smart factory of the future requires."

### **Linking of image processing and automation at automatica**

From June 19 to 22, 2018, automatica is providing its visitors with an ideal platform to learn about machine vision and current hot topics. The major industry suppliers are going to exhibit in Halls A4 and B5 as well as in the Machine Vision Pavilion (joint booth in Hall B5). Consequently, automatica will present the close relation of machine vision to the topics of robotics, handling technology and software and provide visitors with an overview of automated production of today and tomorrow.