Fluid boundaries

Dr. Helge Moritz shares his views on machine vision and automation

Schunk specializes in gripper and clamping technology, and the company exploits synergies between machine vision and automation. Dr. Helge Moritz was recruited as a recognized expert in machine vision. He has been given the task of expanding machine vision capability in the automation business unit.

The interview was conducted by PRAXIS PROFILINE Editor-in-Chief

Thomas Sümmerer

PRAXIS PROFILINE: You are a recognized expert in machine vision, and you have been working since May of this year to enhance machine vision expertise at SCHUNK which specializes in gripper technology and automation. What will be your primary focus over the next few years?

Dr. Helge Moritz: Schunk's core expertise is gripper and clamping technology. Growth has been particularly strong recently in the automation business unit. Machine vision is a key aspect of automation. Machine vision technology has been deployed very successfully at Schunk, but only at the project level. Vision & Control, which is based in Germany, has been a very reliable partner. The goal of the projects was to support grippers, and this is something that we will focus on in the future. Machine vision is also indispensable for our automation business. In my opinion, it was an inevitable step which Schunk could not and did not want to avoid. In the future, optoelectronics will play a bigger role in our automation business.

What opportunities do you see for machine vision suppliers in the mechatronic automation market? What will you be concentrating on?

Dr. Helge Moritz: Statistics published by the German Engineering Federation (VDMA) provide the best indication of how successful machine vision has become. With the exception of 2005 and 2006, machine vision has grown at double-digit rates, and this year should be no different. It makes a lot of sense to be in this business. Our main focus will be on the provision of support systems for special machinery. We supply automation components and pre-assembled modules as well as functional subassemblies which the customers can build into their systems. The role of machine vision in this business segment will continue to increase.

A few weeks ago, you announced that you will be working closely with the German-based firm Vision & Control which specializes in machine vision. What do you expect from this collaboration?

I have already mentioned the statistical surveys which were conducted by the German Engineering Federation. The results of the most recent market analysis (for the year 2006) showed that the market for machine vision sensors increased by 157 per cent. Turnover of illumination products was up 43 per cent and optics increased by 34 per cent. V & C has core expertise in all of these markets. Like Schunk, V & C is a component supplier. Our collaboration in the past has been very productive. Due to the synergy effects, I cannot imagine a better partner for machine vision.

I personally welcome that fact that two German companies have joined forces, because it strengthens the country's position as a business location.

You will be presenting the SRV Vision Sensor at SPS. This product is a result of the collaborative effort. What is the underlying concept behind the SRV?

MThe SRV supports grippers by localizing objects that have not been pre-positioned. The X and Y

Homogeneous and very intensive lightning characterize the SRV

coordinates, rotation angle and degree to which the object matches the expected object parameters are determined and fed for example to a gripper system which can then perform a precision grasping action. A simple graphics display can also be used to perform inspection.

This in itself does not differentiate us from our current competitors. We have paid particular attention to very high intensity homogenous illumination. With our design, we achieve a very short exposure time, which allows us to freeze any type of motion, as well as good depth of field. We can also capture data from a relatively large working distance.

The SRV was developed for mechanical and PLC engineers who are not machine vision experts and who have avoided the technology so far. Their reluctance to use machine vision is understandable when you consider that experts such as IT specialists and physicists have been involved with the technology up until this point.

To make machine vision attractive in this market, the SRV was designed to be very user friendly. These are not just nice words. I can back up this statement. In recent weeks, I have held training for dozens of mechanical engineers who have little experience with software or machine vision. Following familiarization, the engineers were able to get a small application including communication up and running within an hour.

To put it in terms that are simple to understand, if you can operate a cell phone, then you can operate an SRV.

Looking at the future, the market for service robotics is expected to grow significantly. How do you assess the market potential?

Service robotics definitely has a bright future. Our current situation is comparable to that of the computer industry thirty years ago. Service robots in the coming decades will be less functional and humanoid than R2D2 or C-3PO.

Instead, robots will take over unpleasant or dangerous work. The first indications of where we are headed are already visible. We now have robots that search for mines, robotic vehicles that run races in the desert, toy robots and robot kits from companies like Lego. Household robots probably have the greatest potential. Robots will be designed to perform specific tasks for example mowing the lawn, cleaning floors, surveillance, feeding animals and providing care and support for the elderly or disabled.

Humanoid, two-legged robots will certainly remain the exception. However, machine kinematics will become increasingly similar to human kinematics. Schunk is playing a pioneering role by supplying modular robotic products and grippers which resemble the human hand with up to four articulated fingers and tactile sensors.

Service robots in particular require high-speed machine vision systems. What technological trends can we expect to see in the future?

The hardware will get smaller and performance will continue to increase. New technology will open up new applications. Time-of-flight cameras, which can be used to capture 3D images, are one current example. At the moment, the resolution of these cameras is insufficient, and they are too expensive. Other examples are terahertz imaging, which can penetrate into optically dense media creating new opportunities in medical diagnostics, and innovative new biochip technologies. The software will also continue to evolve. New algorithms will be developed, and more elaborate algorithms will run on higher-speed hardware platforms in an acceptable time.

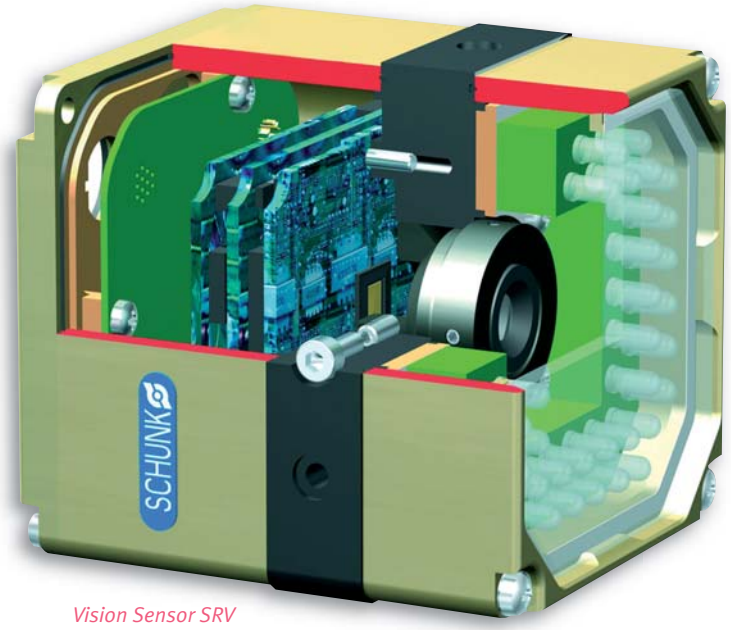
Many people regard machine vision as a key technology on the road to robots with built-in intelligence which can for example autonomously halt or correct a process when a fault occurs. When is the technology to do this likely to be available?

Some solutions are already available which can recognize similar objects. These solutions are based on artificial intelligence and statistical learning theory in particular. It is however important to keep in mind that this technique requires an elaborate training procedure using a large number of sample images, similar to the familiarization process for new employees. Experience shows that this process can be time consuming. Malfunctions can also occur if an incorrect image was used during the teach-in procedure.

The process capabilities of intelligent robots must be carefully scrutinized. Human life may sometimes depend on these robots. However, we can expect to see major progress in the near future. We will be going through exciting times, and Schunkwill be involved.

We have seen a huge increase in intelligent cameras in recent years, which operate autonomously without an external PC and which process imaging data inside the housing. Compact and embedded machine vision systems, which are mounted directly at the machines and offer the option of remote camera placement, are also now becoming available. Which approach is likely to be more successful?

They will all be winners. As was the case with CCD vs. CMOS and USB vs. FireWire, several solutions will coexist which will be used for different applications, at least in the medium term. At this point in time, the vision sensor market is booming. The sensors will continue to become more intelligent and compact, and the boundaries between intelligent cameras and embedded machine vision systems will become increasingly blurred.



Vision Sensor SRV