Application Report

Light-section sensor for bin picking

Faude Automatisierungstechnik GmbH in Gärtringen develops innovative product solutions using forward-looking technologies, such as the UR-6-85-5-A lightweight robot from the Danish company Universal Robots. For the realization of an optimum solution in the supreme discipline of "bin picking," this robot was equipped with a Leuze electronic light-section sensor.

The six-axis robot, with a weight of just 18 kg, places components weighing up to 5 kg in a working radius of 850 mm at a defined position in the room with a repeatability of ± 0.1 mm with the correct orientation – regardless of whether up, down, tilted or rotated. To give the robot the ability to automatically detect the components, it was equipped with a Leuze electronic LPS 36 (Line Profile Sensor) light-section sensor and the Faude "Flexvision" image processing system (see figures). With this solution, pattern detection and position determination of components runs smoothly, thanks to the interaction between the lightweight robot, the image processing and the Leuze electronic light-section sensor.

Of central importance: The LPS 36 light-section sensor

With the LPS 36, Leuze electronic has realized sensors for economical object detection over long measurement ranges from 200 to 800 mm. The transmitters and receivers are contained in an easy-to-install unit with a very compact housing design.

LPS sensors can measure the dimensions or position of objects. Where previously complex sensor solutions, combinations of sensors, or additional evaluation units were necessary, now LPS light-section sensors are used, as the example at Faude impressively shows: With the sensor, the robot automatically detects which component it can grip best. The height information in the sensor offers the possibility of calculating the position in the third dimension. Previous problems with respect to lighting technology in the image processing are eliminated by the light-section sensor, as it is insensitive to ambient light.

The "Flexvision" solution from Faude is an intuitive, high-performance image-detection and processing system specially developed for industrial use. The modular design with the HALCON libraries from MVTec Software of Munich makes the image processing system very flexible.

A very good solution at a low price

The weight, the simple system installation and configuration, and the low price characterize the complete system. The return on investment is achieved in approximately six months through the economical set price of about 38,000 euros. "This intelligent automation system satisfies current market requirements with regard to flexibility, simple operation, process reliability and productivity," sums up Dieter Faude, Managing Director of Faude Automatisierungstechnik GmbH – one of the top 100 companies in Germany in 2009 (www.faude.de/TOP100).

LPS now with HALCON interface

Leuze electronic and MVTec Software have, in the meantime, developed an image acquisition interface for the LPS 36 light-section sensor. With this, the sensors can be operated with the HALCON image processing software from the Munich-based company, which is used around the world. The new interface permits simple detection of equidistant 3D data using the light-section sensors and direct reading of the calibrated 3D data with HALCON software.

The new interface provides optimum support for the functions of Leuze electronic sensors. The integration and application development is quick and easy with the 3D vision operators from the HALCON software library. The measurement data from the LPS 36 sensors of complex 3D applications such as object measurement or during robot gripping can thus be read and further processed. For example, volumes can be calculated and the position of three-dimensional objects in the room can be determined. This saves users the time-consuming tasks of carrying out software developments and programming their own algorithms.

Figures and captions

Figure 1. Using a lightweight robot to precisely set down parts

Figure 2. Robot with light-section sensor

Figure 3. The working radius is up to 850 mm, repeatability ± 0.1 mm

Figure 4. Economical complete solution, consisting of sensor, robot, and software

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