See, Recognize, Grasp

Industrial cameras optimize gripping processes of assembly robots

Stefan Waizmann

Asyril's flexible Asycube feeders, in combination with SVS-Vistek's EXO series cameras, provide a powerful bin picking alternative and increase the productivity of the robots used. (Source: Asyril)

The goal of the Swiss company Asyril is to improve the performance of assembly robots. It uses sophisticated image processing systems to facilitate the gripping of bulk material components by robots used in production, relying on an innovative idea and on industrial cameras from SVS-Vistek.

The attempts of various companies to realize the famous bin picking task could be seen at almost every automation trade fair in recent years i.e. the gripping of the pickup of randomly distributed components by a robot. Despite enormous progress in the field of robotics and image processing, this task still poses a great challenge. The reasons for this are obvious: before a robot can grip a component, an image processing system must first reliably recognize it, calculate its orientation, and then communicate the position and orientation of the gripping points to the robot. In conventional technology, this is still a slow, multistage process (recognition, gripping, correct depositing, gripping with correct orientation). If the components to be gripped are chaotically mixed up and partially concealed, the safe and fast gripping of individual parts often becomes a complex and slow process.

Asyril takes a new approach to this task which is frequently encountered in industry: the Swiss company builds fast, highly efficient feeding systems for pick-and-place robots using a trick that is simple at first glance but very innovative in detail. The bulk material objects lying next to and on top of each other in a box are guided via a feeding hopper to a vibration platform, where they are separated and placed in a position that allows easy access by the robot.

Vibration in three axes

The basic idea of the Swiss goes far beyond conventional mechanical systems such as vibrating pots, explains Asyril product manager Aymeric Simonin: "The special feature of our high-performance feeding systems is that the results of an integrated image processing system are used to control the platform vibrations to seperate the objects. The specialized vision system delivers the necessary data almost in real time, ensuring that the parts are isolated in a controlled manner and brought into a gripping position that is optimal for the robot. After separation by 'intelligent vibrations', the image processing system communicates the data of the position and orientation of the components to be optimally gripped to the pick-and-place robot, for which the job is then very easy. In order to optimize the speed of object detection, the system sends the information about the first detected, well-

Fig. 1 The vibration platform of the Asycube feeders enables controlled movement and separation of bulk material objects. (Source: Asyril)

placed components to the robot before the entire image is evaluated.

The technical basis for this procedure is flexible feeders called Asycube. Asyril developed this innovative, patent-protected 3-axis vibration technology itself, manufactures it in-house and uses it in its high-performance feeding systems. The high-quality actuators cause a platform to vibrate: this vibration can be controlled in terms of strength, frequency and duration, allowing the components to move quickly and accurately in the direction of desire on the vibration platform.

Economical image processing

The second core element of Asyril's flexible feeder solution is the integrated Smartsight vision system, which assesses the quality of the separation and determines the positions of the next optimally positioned parts with knowledge of the robot gripper's capabilities. "An economical design was also important to us for this part of the overall system," stresses Aymeric Simonin. The Swiss company therefore opted for several camera models from the EXO series with resolutions between 1.6 and 12 megapixels (after initial systems based on ECO cameras) from SVS-Vistek which, in addition to image acquisition, also take over control of the light and thus make an additional strobe controller obsolete. "This enabled us to reduce the hardware costs for the entire system and to operate incident and transmitted light with short flash times directly from the camera's power outputs," says Simonin, describing the image processing setup. The timings for light and exposure come directly from the camera, which controls the electrical processes and the integrated four-channel LED driver with its sequencer. Light, sequencer and camera are controlled via a single programming interface.

"Our technology is very flexible and is suitable for loose parts and components of all geometries with sizes ranging from less than 0.1 mm to 150 mm," says Simonin. "The feeders we use enable extremely gentle feeding of parts, which can be a decisive criterion for some applications."

Thanks to their modular design, Asycube feeders can be flexibly and quickly adapted to the properties of the objects. In addition to easily exchangeable hardware modules, this configuration flexibility is also ensured by easy-to-use, PC-based image processing, emphasizes Simonin. "When switching to other products, the advantages of a programmable feeder become particularly obvious: configuration is carried out very quickly via software and this saves expensive hardware setup times. This is a big advantage, especially in markets with very short product life cycles or small series."

Fig. 2 Asycube feeders are very flexible and suitable for extremely gentle feeding of loose parts and components of all geometries with sizes from less than 0.1 mm up to 150 mm. (Source: Asyril)

Companies

SVS-Vistek

As an innovative manufacturer of high quality industrial cameras for more than thirty years, SVS-Vistek GmbH – a member of the TKH Group – has acquired exceptional know-how in industrial image processing. We develop and produce a wide range of standard cameras as well as cameras with the highest resolutions, above-average image quality and all relevant interfaces in our own clean rooms at our headquarters in Seefeld near Munich: Quality Made in Germany!

www.svs-vistek.com

Asyril

Asyril SA – a member of the Nivalis Group – develops, produces and markets high-performance flexible feeding systems for parts and components from 0.1 up to 150 mm in size. Its patented 3-axis vibration technology and intelligent control system are easy to integrate and allow for optimized speed, accuracy and flexibility. Asyril's key competencies and extensive know-how encompass all three sub-domains of modern parts feeding systems: vibration technology, industrial vision and precision robotics.

www.asyril.com

Excellent partners

For the realization of the Smartsight vision system that is integrated into the Asycube feeders, Asyril works together with Fabrimex from Volketswil in Switzerland who, as partners of SVS-Vistek, add their innovative camera technology to tailor-made optical solutions from a single source. Asyril's development enables robots to access individual parts or bulk materials more quickly, leading to considerable increases in efficiency. Our roots are in the Swiss watch industry with its high demands, but the advantages of our technology have now also proven themselves in many other markets, such as the automotive, medical and electronics industries," says a delighted Simonin. "With Asycube Smartsight, we can offer users a fast alternative to the still slow, complex bin picking task and thus increase the productivity of the robots used.

Fig. 3 The core of the image processing system used in the current Asycube feeders is a camera from SVS-Vistek's EXO series. (Source: SVS-Vistek)

The advantages of material feeding through the innovative Asycube solutions have previously been paying off in other ways: at the Motek trade fair in Stuttgart at the end of 2018, Asyril was awarded a prize in the 'components for handling and assembly' category.

Author

Stefan Waizmann has gained more than 15 years of international experience in service and system integration in the post-production business after his master degree in photo engineering. His main focus was on scanning and film recording with specialization in color spaces. This was followed by stations in the development and product management of novel scanners based on CCD line sensors. In Germany he has worked in technical support, as a product manager and is currently at SVS-Vistek in technical marketing for industrial cameras.

Dipl. Ing. Stefan Waizmann, SVS-Vistek GmbH, Mühlbachstr. 20, 82229 Seefeld, Germany; phone:+49 8152 9985-0, fax: +49 8152 9985-79; e-mail: info@svs-vistek.com, Web: www.svs-vistek.com