Flexible quality management with smart cameras

Optics with bite

In cosmetic and pharmacy, you have to observe strict quality directives. As an example, the color, the printing and the lid position of dental floss dispensers can be checked. With smart cameras and the right software, it is possible to read the printing as well as to identify the color and the lid position reliably.

Using a defined area of interest, the camera acquires an image. This image will be binarized and finally an optical character recognition will be performed.

In the morning, normally you will not think about the items you use to get dressed and how they were manufactured. In a feasibility study, MATRIX VISION shows, how to guarantee a constant quality during the production of the dispensers. For this. MATRIX VISION uses the smart GigE camera mvBlueCOUGAR-P and the image processing tools mvIMPACT.

Reading broadens the mind

A closer view to the dispenser shows a printing, which at least contains the best before date (BBD) and the charge number. This information is important especially in the are of cosmetic and pharmacy, given that in the US with directive 21 CFR Part 11 as well as in Europe with the EU directive RL 203/94/EG, the regulations have become more strict. I.e., printings have to be detected and recognized consistently and reliably. During high production output, these procedures have to be powerful, fast and failsafe. With the OCR algorithm of the mvIMPACT OCR module you can solve this task. For this, a Area of interest (AOI) will be defined using a basing point, an image acquired, binarized and afterwards an OCR performed.

Then, the color of the dispenser is interesting. Here, an AOI will also be defined using a basing point and after that the light reflections will be reduced using filters. Subsequently, the Color module is used to perform a color space conversion. The average color values inside the AOI are compared with the values of a configuration file, which was created before and which contains the predefined color ranges. In this way, the color can be identified. As a basing point the label of the dispenser is used, given that the localization is nearly the same on every dispenser.

The last application checks the lid position of the dental floss dispenser. With the Match module a pattern matching will be performed using models. During the inspection all models are checked one after another.

On-memory

All applications are running inside the Flash memory of each mvBlueCOUGAR-P camera. They start automatically and can run without a PC, NFS (network file system), etc. The PC, which is used in the feasibility study, only displays the results, which are transmitted over the network via GigE Vision. Furthermore, the camera can be controlled via configuration file so that acquired images or intermediate images can also be transferred.

On PC side, each camera has his own thread. The thread searches for the camera and establishes a connection, as soon as the local application runs on the camera. Afterwards, all result strings are interpreted and displayed.

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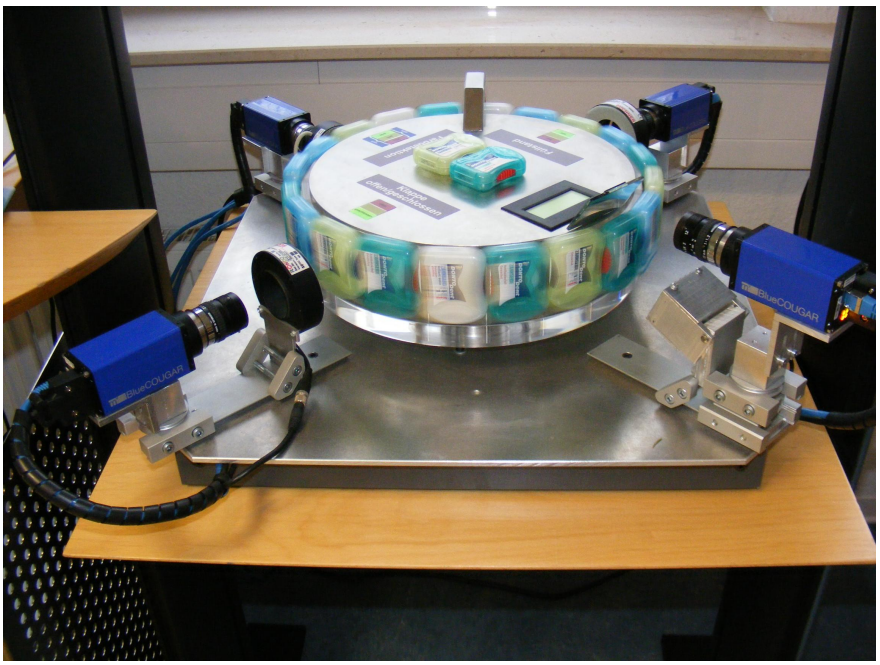

A test stand shows, how smart cameras garantee the quality of dental floss dispensers

For the acquisition and the camera control, whether locally on the mvBlueCOUGAR-P or remote on the PC, the driver interface mvIMPACT Acquire is used. This interface represents the base of all MATRIX VISION products. I.e., all applications which are based on mvIMPACT Acquire can be used with all hardware of MATRIX VISION.

Conclusion

The significant strength of a smart camera is its flexibility, as the sample applications show. Depending on the task, on the one hand the cameras can operate autonomously, on the other hand it is possible to transfer image data and test results to a server, where they will be saved or where the processing will be continued. By the use of preselection, it is further possible to save bandwidth in larger system with multiple cameras. This saving again can be used for cameras with higher resolutions and frame rates or to scale the system with more cameras without any problems.

Technology in detail

The mvBlueCOUGAR-P with a size of 38.8 x 38.8 x 96 mm (width x height x length) is a compact, intelligent industrial camera with Gigabit Ethernet interface. The camera has a 400 MHz processor and 64 MB SDRAM. This is enough memory to reduce delays during the sending and reception of data packages effectively. Area scan sensors are available, CCDs up to 1600 x 1200 pixels (also available with an increased infrared sensivity) and CMOS' up to 1280 x 1024 pixels. Furthermore, the camera contains two digital inputs and four digital outputs and also lens holder for C- or CS-Mount lenses (S-Mount on request). For time critical I/O and acquisition there is a Hardware Real-Time Controller (HRTC). The camera is compliant to GigE Vision and GenICam.