

ADVANCED VISION TECHNOLOGY

SUCCESS STORY

VISION GUIDED ROBOT BIN-PICKING SOLUTION REDUCES MATERIAL HANDLING COSTS

Material Handling Cost Concerns

Programming robots to pick randomly oriented parts can be a challenging automation task, but thanks to today's smart camera technology, the skilled integrators at SYSTEMATIX were able to work with a customer's existing material handling system and achieve the speed and accuracy required for a vision-guided robot (VGR) bin-picking application. The material handling constraint involved the plant-wide use of generic bins and simple layer dividers that eliminated the expense of customized blow-molded trays for each part type, and additional handling costs to switch bin types during part changeovers.

Previously, the customer's low-volume lumbar support unit production utilized four operators to pick actuators from loosely arranged bins, and place them into fixtures for assembly with wire mats. Producing each part took about 90 seconds due to the difficulty in manipulating the flexible wire mat. As production volumes increased, it became necessary to introduce automation with a production target of 12 ppm, but continue using the low cost bin solution.

The existing bins and dividers presented a challenge for implementing an automated solution. While the same bin type can be used on multiple assembly lines, it also means that actuators are not secured on the flat dividers and shift as they are moved throughout the operation. As a result, each randomly positioned part must be located by a machine vision system before it can be picked up by a robot, and because each bin has several layers, the vertical distance from the robot to the layer divider must be recalculated as the bin empties.



A Multi-disciplinary Solution

A typical setup using a 3D sensor — such as a low-resolution, low-speed time-of-flight sensor, a laser-scanning triangulation sensor, or two cameras arranged in stereovision — requires a lot of time to capture the image, send it to a computer or device for processing, analyze with 3D algorithms, and communicate the results to the robot.

The SYSTEMATIX multidisciplinary team of engineers analyzed the automation challenge not only as a vision application, but also as a motion control application. The team determined that by eliminating the third dimension (height) through the use of a distance measuring sensor and mounting the camera to a vertical slide to maintain the distance between the robot and the bin divider, a complex 3D vision application could become a simple 2D application requiring shorter processing time and allowing for more direct communication between the camera and robot.

Best-in-class Technology

In the final configuration, SYSTEMATIX engineers paired an IFM EfectoR 200 photoelectric distance-measuring sensor and a Cognex In-Sight 8000 smart camera with Cognex PatMax technology for part location and robot guidance mounted to an IAI servo-driven slide. The sensor measures the vertical distance to the bin divider and the slide moves up or down to maintain a fixed distance between the camera and the divider surface. This action eliminates the need to calculate the scale of the image the 2D camera sees as the Yaskawa 6-axis robot empties the bin layers and the parts become farther away.

To further optimize cycle time, the integration experts developed a strategy to eliminate cycle time reduction during the bin changing process. By picking one piece from the bin behind the typical pick bin, it allowed more time for the empty bin to move out and a new one to advance.

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The Cognex Suite of Products

Pattern matching is the first step of any machine vision application and involves locating the object within a camera's field of view. It can also be challenging due to the many variables that can alter how an object appears to the system. Cognex PatMax technology was developed to overcome the limitations of pattern matching by learning an object's geometry through a set of boundary curves tied to a pixel grid and then looking for similar shapes in the image without relying on specific gray levels. The result is a significant improvement in the ability to quickly and accurately find objects despite changes in angle, size, and shading.

"Partnerships with leading edge technology suppliers such as Cognex allow us to offer best-in-class automation solutions to our customers."

Rob Veldhuis,
Director of Sales at SYSTEMATIX



The Cognex suite of products also includes Cognex Connect software and as a complete solution, enables the camera to quickly process a part image and compare it to a reference image to determine the part's orientation in the bin. Camera images measured in pixels are translated into robot pick coordinates in millimeters, and the camera communicates the

coordinates directly to the robot without intermediate processing.

Through the integration of motion control technology with best-in-class smart camera solutions SYSTEMATIX was able to achieve new levels of automation, and increase speed, accuracy, and operational efficiency for one of its biggest automotive customers.

Innovation to Serve You Better

We have a well-equipped lab for proving out vision inspection solutions. Send us your RFQ or product samples and our experts can recommend a solution that will work for you.



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