

is and where it is located. Digital information regarding which lane a particular automobile is in can then be used to control a standard traffic controller with the PC digital I/O interface.

“One of the most important design considerations,” says Sherrill, “was compensating for the range of luminous intensities inherent in outdoor operation. For example, when a camera was viewing a westbound road at sunset, sunlight could potentially saturate the image sensor. In nighttime conditions, the system must also be able to detect a car’s headlights as it approaches the intersection.

“By using various sensor arrays, some with a +120-dB dynamic range, washed-out images in such challenging lighting environments are ameliorated. Furthermore, by embedding a global positioning system (GPS) within the smart camera, the position of the Sun can be calculated at all times and used to aid in tracking. Using the GPS data, windows within the panoramic image can compensate for any particular blooming that may occur within specific parts of the image.

“Because the GridSmart system communicates with existing controllers, any existing infrastructure for powering and supervising lights is retained. Additionally, traffic statistics are available for downloading for use in intersection planning and road management,” says Sherrill. Costing \$10,000, the system is still in final development phase, with more than 20 beta sites being deployed for evaluation. ☛

● IMAGE CAPTURE

Smart cameras aid sewing

Linking is used in the garment industry to describe the sewing together of two fabrics such as a collar onto a sweater body or the edging onto curtains. Depending on the garment to be produced, a number of linking sizes are used. Existing linking machines are very basic, and the linking step size, defined by the needle interval, cannot be modified.

Because of this, manufacturers of finished textile goods must purchase several

different linking machines to accommodate different linking step sizes. Multiple linking sizes are used in the knitting industry, and different machines accommodate the production of various types of products. Skilled, highly trained operators must operate several different machines. Because the production of such fabrics demands high-precision stitching, finding qualified employees can be very difficult, a fact that



By using a vision-guided system based on a sewing machine, an operator can link together two different fabrics without the need to use a traditional linking machine.

prompted sewing-machine manufacturer E.R.B.E (Roanne, France; www.erbe.fr) to develop an automated linking machine that encompasses machine vision.

In cooperation with system-integrator Acyrus (Mours, France; www.acyrus.fr), the machine is based on a traditional sewing machine and promises to make linking easier, faster, and more reliable. Since the machine can be programmed for many different linking step sizes, a single machine can replace multiple linking machines. Furthermore, since the machine can recalculate each linking step position as the linking process occurs, the sewing needle is guaranteed to punch each link precisely (see photos).

Based on a traditional sewing machine, the E.R.B.E intelligent linking machine uses an mvBlueLYNX intelligent camera from Matrix Vision (Oppenweiler, Germany; www.matrix-vision.com) to control the needle, ensure that the correct mesh is placed along the garment's existing edge, and ensure that the needle enters the middle of this seam. Image-processing software embedded in the camera ensures the fabric is placed correctly and controls several motors to align the needle precisely.

Because of the embedded processor within the camera and its embedded Linux operating system, all the image-processing and control tasks can be per-

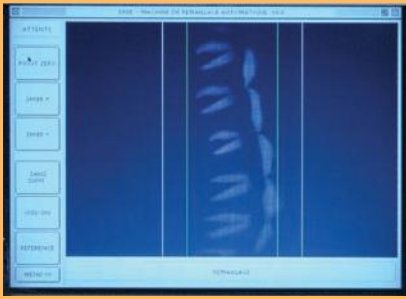
formed within the camera. In operation, the mvBlueLYNX controls three different motors of the sewing machine and the system's ultraviolet LED ring illumination and handles the input signals from the operator's pedals. Additionally the machine can be controlled using a touch screen, whose display and control is also interfaced to the camera.

With E.R.B.E's machine, the operator does not require linking skills to perform the task, merely the skills to use a sewing machine, initiate the linking process, and roughly guide the fabrics under the needle. The vision system guides the needle to the correct location.

Using the new linking machine, linking is 50% faster than manual-only methods and



Fabric ends can be linked to different materials without the need to learn traditional linking skills.



The machine guides the operator through the procedure and displays the links on a flat-panel display.

more reliable. Furthermore, one machine can be used for multiple mesh sizes.

Although an operator is still required, the machine accomplishes much of the important linking task. Furthermore, since only one machine is needed to accommodate many different mesh sizes, manufacturers can save money, and the quality of finished products is less dependent on operator error. ☺

Letter to the Editor

Bundling image processing courses

I came across your article "That joke isn't funny anymore" in the April issue of *Vision System Design*. It is a nice and well-written comment, full of expert knowledge, experience, and even humor. It is easy to identify you as someone who knows what he writes and vice versa. Therefore, I enjoyed your article very much. Although, I probably cannot compete with your entertaining style of writing, I discussed your topic with my students to explain real-world problems in the field of machine-vision integrators.

These students are educated in a four-year-course called "Optical Technologies and Image Processing" at the University of Applied Sciences in Darmstadt, Germany. We hope to belong to the "few universities and colleges that bundle these subjects into a single degree," as you phrased it. It seems that you know more about institutions that offer a similar education. I would be more than happy if you could share this information with me, because we are looking for partners in Germany, Europe, or worldwide to exchange students, and, as you wrote, it is not easy to find some.

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