

## A robot sketches portraits

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The industrial robot sketches a portrait. Credit: Robotlab

Artists are often colorful personalities. This one, though, comes across as cool, precise and metallic – and is anything but extravagant. No wonder – after all, it's an industrial robot, one that will convert the Fraunhofer stand at CeBIT into an art studio. Its artistic genius only emerges if someone takes a seat on the model's stool positioned in front of the robot: first, its camera records an image of its model; then it whips out its pencil and traces a portrait of the individual on its easel. After around ten minutes have passed, it grabs the work and proudly presents it to its public. This robot installation was developed by artists in the robotlab group, at the Center for Art and Media ZKM in Karlsruhe, Germany, some of whom are now employed at the Fraunhofer Institute for Optronics, System Technologies and Image Exploitation IOSB in Karlsruhe.

But how does this technical production aid manage to provide an

authentic rendering of a person's facial expressions? "We have used an image-evaluation process that essentially equips the [robot](#) with the sense of sight," explains Martina Richter, a scientist at IOSB. "There is a camera mounted on the robot's arm that it uses first to take the person's picture." Edge-processing software seeks out the contrasts in the image and translates these to robot coordinates: to movements of the robot's arm.

For the researchers and artists, the main difficulty was to adjust the algorithm for image processing so that the sketched image would leave the impression of a portrait – and so that the high-tech artist would overlook the tiny wrinkles but would still render the eyes. "We attach great importance to the artistic look of the drawings that results, but on the other hand, we have also equipped the robot with an automatic system that enables it to carry out all of the steps itself. With this installation, we have created an interface between art, science and technology," Richter is convinced.

The robot's everyday routine is less artistic, however: ordinarily, researchers at IOSB use it to analyze the optical reflection properties of various materials. They shine light on an object - a reflector of the kind mounted on children's school bags or jackets, for instance - from various directions. The robot's arm circles the material sample in a hemispheric pattern, measuring how the object reflects light. Experts refer to this as a material's spatial reflection characteristics. This helps design objects such as reflectors so that they return light in the most bundled way possible to the direction from which it comes – to a car driver, for instance. Then the reflector emits a bright flash that draws the driver's attention to the child. The objective is different when it comes to paint effects on a car's own surface: The aim there is to display different hues to the observer depending on the direction of view.

From March 6-10, 2012, researchers will be presenting what may at first

seem to be a contradiction at CeBIT in Hanover, Germany. There, interested visitors can view the metal painter in action and can even have it sketch their own faces.

Provided by Fraunhofer-Gesellschaft

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