



New Sophisticated Imaging Device - Flexible, Flat, and Transparent

21 February, 2013

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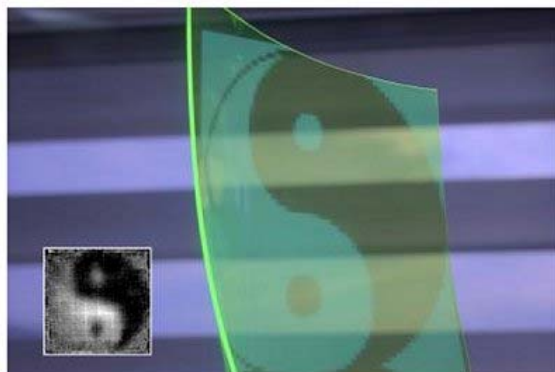
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MessageToEagle.com - An entirely new way of capturing images based on a flat, flexible, transparent and potentially disposable polymer sheet has been developed by an Austrian team of researchers.

The new imager resembles a flexible plastic film and uses fluorescent particles to capture incoming light and channel a portion of it to an array of sensors framing the sheet.

Digital cameras, medical scanners, and other imaging technologies have advanced considerably during the past decade. However, most image sensors are still planar, opaque, and inflexible.



This shows a comparison between the (ground truth) image being focused on the sensor surface and the reconstructed image (inset).

With no electronics or internal components, the imager's elegant design makes it ideal for a new breed of imaging technologies, including user interface devices that can respond not to a touch, but merely to a simple gesture, according to researchers.

▶ × "To our knowledge, we are the first to present an image sensor that is fully transparent -- no integrated microstructures, such as circuits -- and is flexible and scalable at the same time," Oliver Bimber, of the Johannes Kepler University Linz in Austria and co-author of the [paper](#) said.

The sensor is based on a polymer film, which is suffused with tiny fluorescent particles that absorb a very specific wavelength (blue light for example) and then reemit it at a longer wavelength (green light for example).

Some of the reemitted fluorescent light is scattered out of the imager, but a portion of it travels throughout the interior of the film to the outer edges, where arrays of optical sensors (similar to 1-D pinhole cameras) capture the light.

A computer then combines the signals to create a gray-scale image.

"With fluorescence, a portion of the light that is reemitted actually stays inside the film," says Bimber. "This is the basic principle of our sensor."

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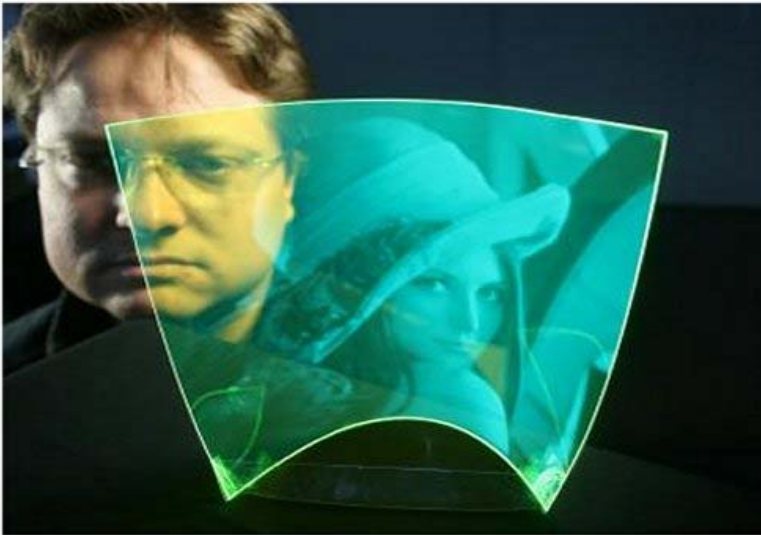
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This shows the world's first flexible and completely transparent image sensor. The plastic film is coated with fluorescent particles.

The main application the researchers envision for this new technology is in touch-free, transparent user interfaces that could seamlessly overlay a television or other display technology. This would give computer operators or video-game players full gesture control without the need for cameras or other external motion-tracking devices.

Additionally, the new sensor could be attached in front of a regular, high-resolution CCD sensor. This would allow recording of two images at the same time at two different exposures.

"Combining both would give us a high-resolution image with less overexposed or underexposed regions if scenes with a high dynamic range or contrast are captured," Bimber speculates. He also notes that the polymer sheet portion of the device is relatively inexpensive and therefore disposable.

"I think there are many applications for this sensor that we are not yet aware of," he concludes.

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office," said Bedrich Benes, an associate professor of computer graphics at Purdue University.

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