

**New transparent, flat, flexible image sensor offers potential for gesture control displays**

An image capturing device using a single sheet of polymer that is flat, flexible and transparent has been developed by a research team from the Johannes Kepler University Linz in Austria. The polymer sheet used in the imaging device resembles nothing more than a flexible plastic film, but uses fluorescent particles to capture incoming light before sending a portion of it to an array of sensors placed around its edges. With no internal components or visible electronics, the researchers say the see-through sheet would be ideal for use in future devices that rely on a gesture rather than touch interface.

A polymer film known as a luminescent concentrator (LC) is the basis for the new imager. The sensor is coated with tiny fluorescent particles that absorb specific wavelengths of light before re-emitting it at a longer wavelength. While most light shone onto a polymer sheet will pass right through, a portion of the light will travel through the interior of the film to the edges. This allows arrays of optical sensors (similar to 1-D pinhole cameras) positioned around the outer edges of the sheet to capture the trapped light and send the information to a computer, which combines the received signals to create a gray-scale image. Unlike charge-coupled devices (CCDs) found in most consumer video cameras, which are divided into individual pixels, the luminescent concentrator within the imager functions as a single light gatherer, where light from all points across its surface travel to the edge sensors. Therefore the challenge was determining precisely where light was hitting its surface. To solve this, the team used a similar approach to a previous experiment that used light attenuation to track a single laser point on a screen. As light travels through the polymer to the edges, it becomes dimmer. By measuring the relative brightness of light reaching the sensor array, the researchers were able to deduce where on the polymer's surface the light had entered. This was done by measuring how much light arrives from every direction at each part of the sensor array on the film's edge. From there, the image was reconstructed using a similar technique to X-ray computed tomography, or CT scans. "In CT technology, it is impossible to reconstruct an image from a single measurement of X-ray attenuation along one scanning direction alone," noted Oliver Bimber, a member of the research team. "With a multiple of these measurements taken at different positions and directions, however, this becomes possible. Our system works in the same way, but where CT uses X-rays, our technique uses visible light."

The current resolution of the sensor is still low at 32 x 32 pixels, mostly due to the low-cost photodiodes being used in the device. Yet, the team is planning better prototypes, which they say will cool the photodiodes to achieve more efficient signal-to-noise ratios. Ultimately, the imaging sensor could be used in transparent interfaces that overlay common devices, such as televisions and other display technologies. For example, it could offer gesture-control in video games without using cameras and motion-tracking devices. The flexibility of the material means it could also be used as an input device on curved objects, and finally, by using multiple layers of the transparent polymer, it may be possible to capture different wavelengths in each layer, thus producing color images. The paper was published in the Optical Society's (OSA) open-access journal *Optics Express*. The researchers say the new image sensor could eventually find its way into devices like digital cameras and medical scanners, and that it may help to usher in a new generation of gesture-controlled smartphones, tablets and TVs.

[Previous Article](#)

[Next Article](#)

[Forward Article](#)

[Print Article](#)

[Leave a Comment](#)

[Back to list of articles](#)

Feb 28, 2013

[SHARE](#)  
0

[Be Our Fan](#) | [Follow Us](#)

**plastemart** *Materials*.com  
Materials For Plastics Industry

**plastemart** *jobs*.com  
Jobs Portal For Plastics Industry - PLACEMENT - TRAINING