

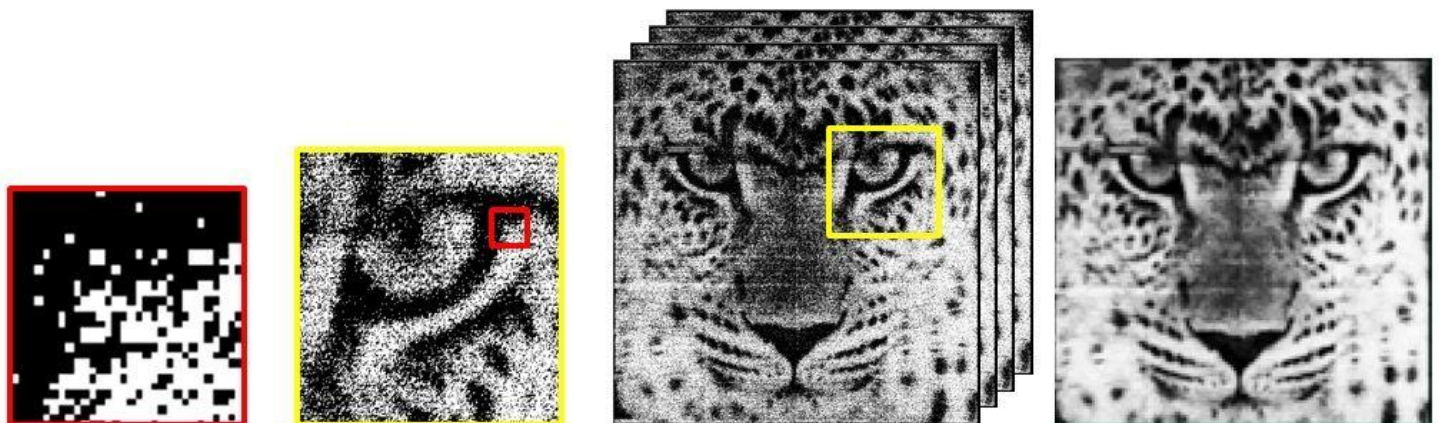
MORE
▼

LOG IN SIGN UP

Visual Culture

Revolutionary New Sensor Will Allow Photographers to Shoot in the Dark

By Molly Gottschalk Feb 21, 2018 5:51 pm



Courtesy of Eric Fossum.

In the early 1990s, an engineer named Eric Fossum revolutionized photography by creating the image sensor now found in nearly every smartphone and digital camera around the world. Now, he's poised to do it again.

A team of engineers at Dartmouth's Thayer School of Engineering, where Fossum is a professor, have developed a new technology, called the Quanta Image Sensor (QIS), that radically improves on the current technology's ability to take high-quality images in extremely low-light situations—from the most difficult feats of photojournalism to explorations in the depths of outer space.



MORE

LOG IN SIGN UP

the now-universal CMOS technology Fossum invented at NASA's Jet Propulsion Lab in the '90s, use pixels to measure particles of light in groups. However, the so-called jots within the QIS's semiconductor chip, named after the greek word for "the smallest amount," are so sensitive that they can detect a single particle (or photon) of light.

"It gives us the greatest possible sensitivity to light since we can detect the most elementary part of light, the photon," said Fossum.

He envisions a future in which we can capture, even in the dimmest possible settings, extremely high-quality digital images. And from there, if desired, manipulate the image at the most fundamental level using raw photon data. (Fossum details the technology's implementation in a research paper published in the optics and photonics journal *Optica*.)

While this isn't the first imaging technology that is able to detect single photons, it is, significantly, able to do so at room temperature and at low-cost, using standard manufacturing processes. That means production costs could foreseeably lower to a level at which the QIS chips might see widespread adoption.

Even so, Fossum said, there will likely be a significant period of time until the technology finds its way into the hands of professional photographers or consumers. The CMOS sensor, which today is installed in over 100 cameras every second, took two decades to catch on. He said that five- to twenty-year timelines for new technology to break out into the mainstream are normal.

"There's a long period of growth or incubation with technology where you have to work out small kinks, you have to find the particular application that has high volume, and this takes time for almost every technology that's out there," he said. In this particular case, he said that period could be even longer due to how well the CMOS sensor serves for most photographers' needs.

"We have to look at the things [the QIS chip] can do that are much better than the current technology," he said.

MORE
▼

LOG IN SIGN UP

where operating with the smallest amount of light possible is critical to success. For example, the QIS chip will greatly outperform previous technologies astrophysicists currently use when attempting to capture images of planets orbiting distant stars.

But the eventual benefits of the QIS chip to consumers and professional photojournalists are also easy to grasp: Anyone who has tried to shoot a photo or video during a dark concert has learned that capturing moving images under low light most often leads to blurry or pixelated results. A camera equipped with QIS technology would have orders of magnitude more light in such a scenario than what it would require (a single light bulb produces more than a billion-billion photons per second), allowing for images of moving objects shot in low light to be perfectly sharp and identifiable.

Fossum said the technology has more artistic applications as well. “The really cool thing for this new image sensor is that its response to light is exactly the same of old photographic film,” he said.

When exposed to light, the jots in the QIS sensor respond very similarly to the grains contained within black-and-white film: small, light-sensitive, silver halide crystals that are more or less sensitive to one photon and, if exposed to light and developed, turn silver and become the black part of your negative. Similarly, in the QIS chip, a jot not struck by light turns black. By comparison, because CMOS sensors require whole “buckets” of photons, Fossum said there is far less ability to control the grain and exposure of an image in post-production.

The QIS chip, he said, is the result of a decade of thinking about what comes next: “What are the outstanding problems with imaging, or image capture, and how do we go about breaking the mold and thinking about new ways of capturing images.” But, it’s just one step along that path, he said.

“We haven’t finished doing new fun things in imaging technology yet.”



Search...

MORE



LOG IN

SIGN UP

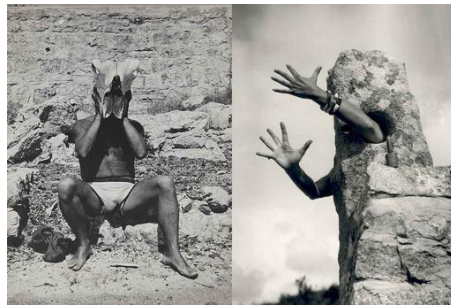
Further Reading in Visual Culture



Why Andy Warhol Would Have Loved RuPaul's Drag Race

By Alina Cohen

Feb 23, 2018



8 Surrealist Photographers You Should Know, from Dora Maar to Man Ray

By Rachel Lebowitz

Feb 22, 2018



Carsten Höller on Why Adults Should Take Slides Seriously

By Carsten Höller

Feb 19, 2018

Home

Artists

Shows

Galleries

Museums

Fairs

Auctions

Magazine

SIGN UP

LOG IN



 Search...

MORE
▼

LOG IN **SIGN UP**
