Creative Cameras exhibit explores light-in-flight imaging

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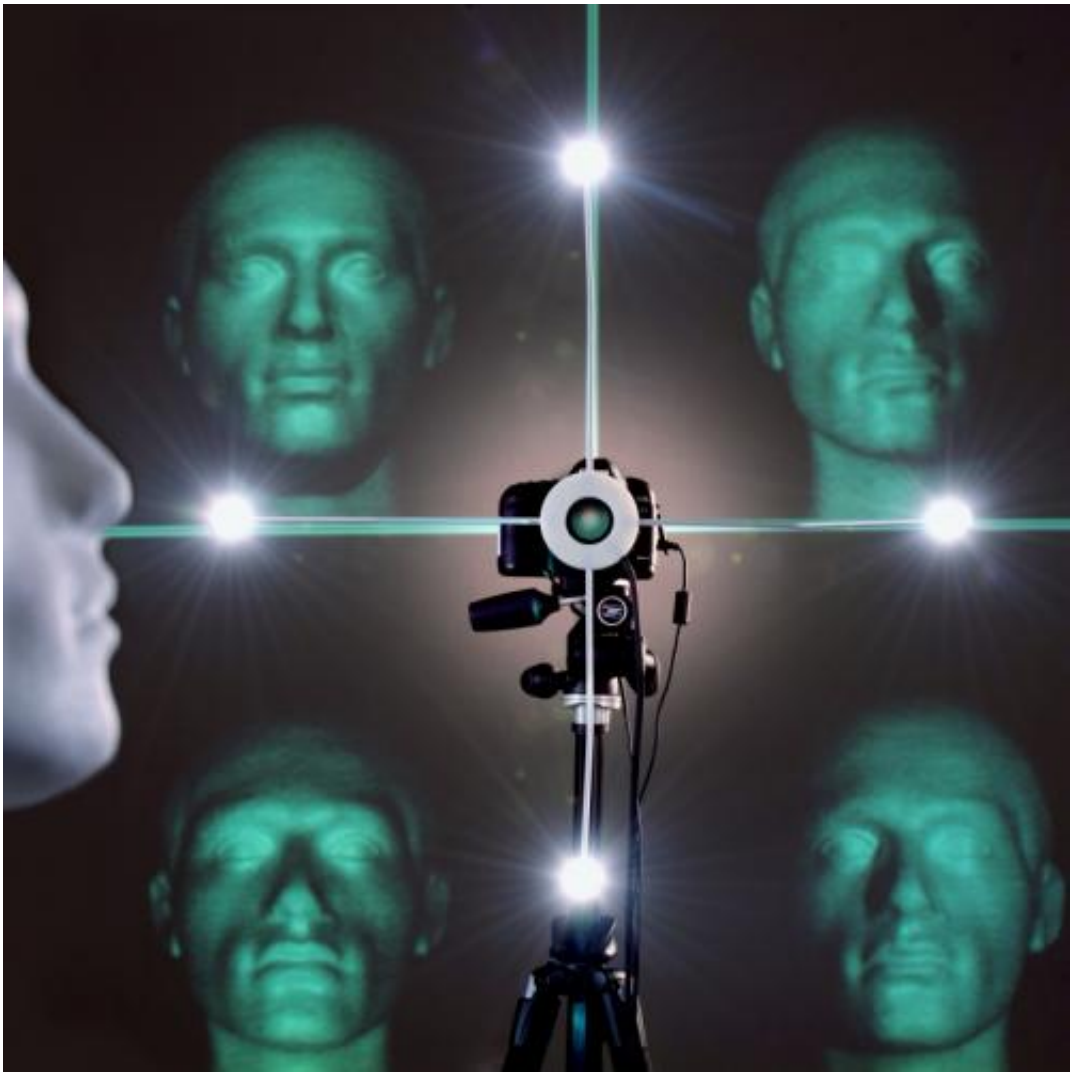

The Creative Cameras exhibition team from Heriot-Watt University and the University of Glasgow are asking some interesting questions. How do you take images so fast that you can see light travelling through air? How do you take pictures without using a camera? And how do you use technology to look around corners and see objects that otherwise would be hidden from view? Those are questions that researchers from Heriot-Watts University and the University of Glasgow are placing under investigation as they explore new imaging strategies. Their Creative Cameras exhibit is taking place at the Royal Society's Summer Science Exhibition from July 1 to 6. Dr. Jonathan Leach, lecturer, Heriot-Watt School of Engineering and Physical Sciences; Photonics and Quantum Sciences, explained the team's work on a camera that can film at the speed of light, allowing them to video pulses of light as they travel through air.

"Light is made up of photons, traveling at 300 million meters per second. And nothing can travel faster than the speed of light. Photons travel so fast that normal cameras cannot freeze their motion as they move." The researchers at Heriot-Watt University use a new type of camera, though, that he said is so sensitive and so fast "that we can capture individual photons and take videos of pulses of light as they travel through air." According to a Royal Society exhibit description of the camera, "One application of this technology is looking around corners to see objects hidden from view."

The camera, developed by the University of Edinburgh, is made up of an array of single photon-sensitive pixels; these pixels have two special properties. The first is their sensitivity to single photons – each pixel is around ten times more sensitive than a human eye; the second is their speed – each pixel can be activated for just 67 picoseconds, said Leach, more than a billion times faster than one can blink. "These properties allow us to perform light-in-flight imaging," he said, an imaging approach where light itself is captured as it travels through air and

scatters off objects.

The camera works in combination with a pulsed laser source. Photons in the pulse of light travel through air…..in the video, he said, one sees them reflecting off a series of mirrors. The pulses randomly scatter photons when colliding with air molecules; some of these photons are captured by the camera. The camera lends itself to applications where precise timing information is needed. One such application is recording the scattered light from objects hidden from view, he said, enabling looking around corners.

More information: — sse.royalsociety.org/2014/creative-cameras/ — www.gla.ac.uk/schools/physics/ … rch/creativecameras/