



Camera that sees invisible danger to make land, sea and air safer

A group of European scientists are developing a surveillance camera harnessing new photonics technology that will dramatically reduce coastal rescue times in low visibility conditions, target pollution and keep us safer on the Underground.

The camera, measuring the size of a shoebox, uses Multi Spectral Imaging, a process that captures the same image at different frequencies from the electromagnetic spectrum.

Certain combinations of multispectral images can reveal information that humans cannot see, such as invisible or poisonous gasses, or fire sources through dense fog, providing an unrivalled level of surveillance.

Current MSI cameras are unsuitable for moving objects or real-time observation because they are not 'snapshot' devices and use a filter wheel that needs to be rotated. They contain sensors which use technology that needs to be cooled to work, meaning the equipment is bulky.

Weighing less than 2kg, the breakthrough device deploys the latest photonic sensing technology, featuring a multi-aperture, multi sensor camera capable of capturing several wavelengths simultaneously in one place.

With the World Health Organisation estimating in 2014 that nearly 600,000 deaths are a result of air pollution in Europe, and with monitoring of civil infrastructures being an important area for video surveillance equipment and services in the future, this device looks set to play a key role in high-tech safety and security.

Coordinated in Spain, the SEERS, or 'Snapshot spectral imager for IR surveillance', project has received a grant of €3,750,535 from Horizon 2020 via the Photonics Public Private Partnership. Project coordinator, Anton Garcia-Diaz explains:

"The SEERS device is equipped with integrated computational imaging. It has no need for cooling and can process the images in real-time, meaning key parts of processing are embedded within the device."

This is not just good news for coastal and traffic surveillance but also the implications for the future of safety in tunnels and the Underground tube train network are exciting.

"Accidents in tunnels, while rare, are extremely serious when they do happen. Responding quickly and in a targeted manner is vital. We expect rescue and response times will be cut significantly with the SEERS camera", Garcia-Diaz said.

Based on CMOS compatible FPA manufacturing technology means it is much cheaper than alternative IR technology. A commercial monochromatic camera working in the mid infrared range of 3-5 μm wavelengths is a bulky, cooled device that costs anything over €70,000.

"Few imaging systems exist with the capability to identify gases, but even they can cost over €100,000. The SEERS project aims to deliver MSI technology in an extended infrared

domain at under €40,000 with improved persistence and gas identification capabilities”, said Garcia-Diaz.

About SEERS

The major goal of SEERS is to develop a snapshot spectral imager in the IR range based on low cost uncooled FPAs, with embedded processing capabilities. The targeted range includes near infrared (NIR), short wavelength infrared (SWIR), mid wavelength infrared (MWIR), and long wavelength infrared (LWIR).

SEERS (Snapshot Spectral Imager for IR Surveillance) will develop a modular, compact and cost effective snapshot spectral imaging system in the infrared domain (0.7-14 µm wavelength). It will be endowed with embedded vision and cognitive fusion capabilities. Robust visibility, robust temperature imaging, gas detection and discrimination, and spill detection will enable event-driven video analysis. Breakthrough performance will be demonstrated in two relevant application scenarios: coastal and road tunnel surveillance.

About Photonics21

Photonics21 is the European Technology Platform (ETP) for photonics –a technology encompassing all of the products and processes around the emission, manipulation and detection of light. It is integral to a wide range of industries that include the medical, healthcare, transport, manufacturing, and telecommunications sectors. In December 2005 "Photonics21" was set up to bring the community of photonics professionals and industries together.

In September 2009, the European Commission defined photonics as one of five European Key Enabling Technologies (KET's) and shortly after the European Research & Innovation Program "Horizon 2020" invited Photonics21 to become a "Public Private Partnership" (PPP). In November 2013 the "Photonics 21 Association", a legal entity under Belgium law, became the private contract partner in a Public Private Partnership (PPP) in conjunction with the EU Commission.

Today Photonics21 represents more than 2600 personal members from all over Europe. Our members are experts in the photonics industry, research organisations and universities who actively engage with us to develop a joint photonics strategy for future research and innovation in Europe.

With the global photonics market growing at twice the world economic growth rate, from 350 Billion Euros in 2011 to 615 Euros in 2020, Photonics21 stands in a secure global market position. The production of European photonics alone accounts for 60 billion Euros and employs over 350,000 people directly.

With strong growth forecast, current industry trends like digitalisation, resource efficiency, individual and zero failure production will drive the photonics industry further.

For more information about Photonics21 please go to

<http://www.photonics21.org/index.php>