



The Awardees

Michael Tompsett

Dr Michael Tompsett is an engineer, inventor and the founder director of the US software company TheraManager. He invented the imaging semiconductor circuit and the analogue-to-digital converter chip at the heart of the charge-coupled device or CCD image sensor technology used by most modern digital cameras and smartphones. Born in Britain, he studied physics at the University of Cambridge and also complete an engineering PhD there (1962-66).

Tompsett invented the un-cooled pyro-electric thermal imaging television camera tube in 1968 while working at the Electric Valve Company (now e2v) in England. This provided electronic scanning at room temperature – previously scanners required cooling by liquid nitrogen. Its solid state version is the basis for thermal imagers used by search and rescue services and the military. Thermal imaging is also an important diagnostic and screening tool within medicine and a part of Tompsett's original patent serves as the basis for nuclear event, space and astronomy imagers. After joining AT&T Bell Telephone Laboratories in the United States, Tompsett ran their CCD group during the 1970s. He exploited the device's potential for digital imaging and, together with his team, developed a series of CCD cameras and produced the first pixel CCD colour image in 1973. It was a picture of his wife and made the cover of Electronics Magazine.

After taking early retirement from Bell Labs in 1989, he joined the US Army as Director of Electron Device Research for six years. In 2012 the US Government awarded him the National Medal of Technology and Innovation, its highest honour for engineers and inventors. He has also been presented with the IEEE Edison Gold Medal and was elected a Member of the National Academy of Engineering.



Nobukazu Teranishi

Nobukazu Teranishi is a professor at two universities in Japan - the University of Hyogo and Shizuoka University - developing photon counting image sensors for visible light X-ray. After gaining a degree and a Masters in physics at the University of Tokyo, he advanced image sensors and cameras at the NEC Corporation (1978-2000) where he invented the pinned photodiode in 1980, resulting in higher image quality, smaller pixel sizes and higher resolution images. Teranishi also worked at the Panasonic Corporation (2000-13) and continues to develop image sensors for various applications.

Born in Japan in 1953, he holds numerous patents in his homeland and the United States. Teranishi's awards include the Prize of the President of KEIDANREN of National Invention Awards (1994), Persons of Scientific and Technological Research Merits Commendation by Minister of State for Science and Technology (1997), Progress Medals from the Royal Photographic Society (2010 and the Photographic Society of America (2011) and the Yamazaki Teiichi Award (2013).

Eric Fossum

Eric R Fossum is a professor of engineering at the Thayer School of Engineering, New Hampshire, USA, and a serial entrepreneur. After graduating from Trinity College, Hartford, Connecticut in 1979, he gained a Masters (1980) and PhD (1984) in engineering and applied science from Yale University. He worked at Columbia University's Electrical Engineering faculty (1984-90) and then joined NASA's Jet Propulsion Laboratory. While at NASA, Fossum invented the CMOS active pixel image sensor and the so-called 'camera-on-a-chip' CMOS image sensor. He also led the sensor's development and technology transfer to US industry. He has been CEO of two high tech companies – Photobit Corporation and Siimpel Corporation – and was a consultant for Samsung Electronics 2008-13.



Fossum began winning awards at an early age. He received the National Science Foundation Presidential Young Investigator Award (1986-1990) with later awards including a NASA Exceptional Achievement Medal (1996), the Royal Photographic Society Progress Medal (2004), the Yale University Wilbur Cross Medal and the Society of Motion Picture and Television Engineers Camera Origination and Imaging Medal (both 2014).

He was inducted into the National Inventors Hall of Fame in 2011 and is a volunteer for its Collegiate Inventors Competition and also Camp Invention, where young children take part in a one-week summer camp to unleash their inner inventor.

George Smith

In 1969, at the Bell Laboratories, USA, George E Smith and Willard Boyle came up with the original concept for the charge-couple device or CCD. Though originally intended as a computer memory circuit, the CCD went on to form the basis of digital image sensors.

Smith, who was born in New York, joined the US Navy after High School and took a maths course at a local university while stationed at an air base in Miami. After serving his country for four years, and with financial help thanks to the GI Bill of Rights, he studied physics at the University of Pennsylvania and gained a Masters and PhD in physics from the University of Chicago. Smith then joined the famous Bell Laboratories in New Jersey, USA, performing pure research. Boyle was his head of department.

Originally called 'charge bubble devices' (because small magnetised areas called bubbles or domains stored one bit of data), their CCD design transferred charge along the surface of a semiconductor instead. This meant it could be used for digital memory, like the magnetic bubble, or for imaging devices. Smith remained at Bell Labs until his retirement in 1986 working on a range of technologies, from lasers and the electronic structure of solids to electroluminescence. A keen sailor, he was also editor of Electron Device Letters for the Institute of Electrical and Electronics Engineers.



Smith and Boyle shared the Nobel Prize in Physics in 2009 for their work in electronic memory design. This concept was the basis for the light-sensitive charge coupled device, or CCD, invented by Dr Michael Tompsett.