

Queen Elizabeth Prize for Engineering awarded to the creators of digital imaging sensors

London, 01 February 2017: Four engineers responsible for the creation of digital imaging sensors have been honoured with the world's most prestigious engineering prize. The Queen Elizabeth Prize for Engineering is a £1million prize that celebrates world-changing innovations in engineering. This year's winners have received the prestigious award for their contributions in revolutionising the way we capture and analyse visual information.

Engineers Eric Fossum (USA), George Smith (USA), Nobukazu Teranishi (Japan) and Michael Tompsett (UK) were today announced as the winners by Lord Browne of Madingley in the presence of HRH The Princess Royal at the Royal Academy of Engineering, for their combined contribution to digital imaging.

The prize was awarded for three innovations spanning three decades, which have radically changed the visual world; the charge coupled device (CCD), the pinned photodiode (PPD) and the complementary metal oxide semiconductor (CMOS) image sensor. Together, this image sensor technology has transformed medical treatments, science, personal communication and entertainment. Thanks to this series of engineering innovations, today's cameras can fit on a fingertip and are found in countless portable devices around the world.

Every second, around 100 cameras are made using CMOS technology, allowing us to share in excess of 3 billion images a day. From uploading photographs and videos to social media, to enabling autonomous vehicles or biometric fingerprint recognition on smartphones and tablets, the global use of digital imaging has grown at a phenomenal rate.

Digital imaging sensors have enabled high-speed, low-cost colour imaging at a resolution and sensitivity that can exceed that of the human eye, offering instant access to intricately detailed pictures and video ranging from the minute scale of cell structures to images of stars and galaxies billions of light years from Earth.

The image revolution began in the 1970s with the development of the charge coupled device (CCD) by **George Smith** and Willard Boyle (now deceased) and later its use in imaging by **Michael Tompsett**.

The CCD is the image sensor found inside early digital cameras that converts individual particles of light, or photons, into an electrical signal. The charge is then converted into a binary digital form by an analogue-to-digital converter, and the image is stored as digital data.

Originally intended for use in computer memory, it was Tompsett who recognised the imaging potential, inventing the imaging semiconductor circuit, complete with analogue-to-digital converter. The following decade, **Nobukazu Teranishi** invented the modern pinned photodiode (PPD), which reduced the size of light-capturing 'pixels' and significantly improved the quality of images. The development of the CMOS sensor by **Eric Fossum** in 1992 allowed cameras to be made smaller, cheaper and with better battery life.

Professor Sir Christopher Snowden, Chair of the Judging Panel, said of choosing the winner: "A picture is a universal form of communication. It can be shared instantly with anyone around the world, no matter what language they speak. We chose this innovation to win the QEPrize this year because it epitomises what the prize stands for. Everyone around the world, especially young people, understands the importance of images. This engineering innovation is inspirational, it is truly something that everyone can understand, and it has had a remarkable social impact worldwide."

Chairman of the Queen Elizabeth Prize for Engineering Foundation **Lord Browne of Madingley** said: "The 2017 Queen Elizabeth Prize for Engineering is awarded to four engineers who have revolutionised the way we capture and analyse visual information. The spirit of international collaboration which drives the work of George Smith, Michael Tompsett, Nobukazu Teranishi and Eric Fossum encapsulates perfectly the ideals of the Queen Elizabeth Prize for Engineering. In honouring them we hope to inspire the next generation of engineers to continue to push back the frontiers of the possible."

The winners of the innovation will be formally honoured in a ceremony at Buckingham Palace later this year, and along with the £1 million prize, each will receive an iconic trophy. The 2017 trophy was

selected through the international Create the Trophy competition, and was designed by 15-year-old Samuel Bentley, from Wales.

Ends

Interview Requests

For more information or to request an interview with any of the judging panel please contact media@qeprize.org

Assets

Stills and official QEPrize logos are available to hi res download from: <http://qeprize.org/news/media/>

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About the Queen Elizabeth Prize for Engineering

The Queen Elizabeth Prize for Engineering (QEPrize) is the world's leading engineering prize, celebrating the engineers responsible for a ground-breaking innovation in engineering that has been of global benefit to humanity. The biennial £1million prize aims to raise the public profile of engineering and inspire young people to take up the engineering challenges of the future.

The inaugural winners, in 2013, were Robert Kahn, Vint Cerf, Louis Pouzin, Sir Tim Berners-Lee and Marc Andreessen for revolutionising the way we communicate. In 2015, the QEPrize was awarded to

Dr Robert Langer for his pioneering work in controlled release large molecule drug delivery systems, which have benefitted the lives of more than 2 billion people worldwide.

About the Queen Elizabeth Prize for Engineering Foundation

The Queen Elizabeth Prize for Engineering Foundation is a charitable company limited by guarantee and was established to administer the Queen Elizabeth Prize for Engineering.

The Queen Elizabeth Prize for Engineering is funded by an endowment which has been established with generous support from the following corporate donors: BAE Systems plc, BP plc, GlaxoSmithKline, Jaguar Land Rover, National Grid plc, Nissan Motor Corporation, Shell UK Ltd, Siemens UK, Sony, Tata Steel Europe, Tata Consultancy Services and Toshiba.

The chairman of the Queen Elizabeth Prize Foundation (QEPrize Foundation) is Lord Browne of Madingley. Making up the trustee board are Professor Dame Ann Dowling, Mala Gaonkar, Sir Paul Nurse and Sir John Beddington. Sir Mark Walport, Chief Scientific Adviser to UK Government, is adviser to the board.

The QEPrize is run on behalf of the QEPrize Foundation by a team based at the Royal Academy of Engineering in the UK.

About the Royal Academy of Engineering

As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering.

We have four strategic challenges: make the UK the leading nation for engineering innovation; address the engineering skills crisis; position engineering at the heart of society; and lead the profession.