



*In 1969 Willard S. Boyle and George E. Smith, while working at Bell Laboratories, designed the first Charge Coupled Device (CCD), a working version was produced just a year later. The CCD as we know has become the bedrock the digital imaging revolution including digital photography and video. They have just been honored with the Charles Stark Draper Prize which is presented by the National Academy of Engineering, this includes a \$500,000 award.*

*Bell Labs, the research and development arm of Lucent Technologies, today announced that Dr. Willard Boyle and Dr. George Smith, both former researchers at Bell Labs, are this year's recipients of one of the highest honors in engineering, the National Academy of Engineering's (NAE) Charles Stark Draper Prize, for their invention and development of the charge-coupled device, or CCD. This award honors engineers whose accomplishments have significantly impacted society.*

*CCD technology, which transforms patterns of light into useful digital information, is the basis for many forms of modern imaging. Today the most noticeable impact is its universal use in digital cameras, video cameras, bar code readers, and image scanners such as copy machines. Both Boyle and Smith were members of the Semiconductor Components Division*

*at Bell Labs and began their seminal work on the CCD in 1969.*

*The award will be presented on February 21st, 2006, at a ceremony in Washington D.C., during National Engineers Week. Accompanying the recognition is an award of \$500,000, which will be shared between Boyle and Smith.*

*"We would like to congratulate Boyle and Smith on receiving this significant award and to thank them for their pioneering work in CCD technology," said Rod Alferness, Senior Vice President of Research for Bell Labs. "The CCD is one of those crucial breakthroughs that lead to innovations in sometimes unexpected areas. In fact, Bell Labs continues this legacy of innovation today and currently has research that builds on Boyle and Smith's breakthroughs in areas as diverse as nanotechnology and advanced photonics for applications in communications, next generation computing, and homeland defense."*

*Leveraging pioneering foundational work in both the transistor and solar cell technologies, both of which were invented at Bell Labs, Drs. Boyle and Smith designed and developed the first CCD in 1969. By 1970, the Bell Labs researchers had built the CCD into the world's first solid-state video camera. In 1975, they demonstrated the first CCD camera with*

image quality sharp enough for broadcast television.

Since its invention, the CCD has spawned significant new industries and markets by enabling a wide range of products including digital cameras, camcorders, high-definition television, security monitoring, medical endoscopy, modern astronomy and video conferencing. The insights behind CCDs also played a crucial role in the emergence of optical networking, which is the underlying transport technology for both the Internet and all other core communication networks today.

Beginning in 1983, telescopes were first outfitted with solid-state CCD cameras, which enabled astronomers to study objects thousands of times fainter than the most sensitive existing photographic plates, and enabled scientists to image in seconds what would have taken hours before. Today, most optical observatories, including the Hubble Space Telescope, rely on digital information systems built around "mosaics" of ultra sensitive CCD chips. CCD-enabled cameras also are used in satellite observations of the earth for environmental monitoring, surveying, and surveillance.

From 1953 to 1979, Boyle led Bell Labs research in optical and satellite communications, digital and quantum electronics, computing, and radio astronomy.

Boyle was also part of the scientific team that helped NASA select the site for the first Apollo landing on the moon in 1969. He now resides in Nova Scotia, Canada.

Smith performed research at Bell Labs from 1959 to 1986. For much of this time, he led research aimed at creating novel lasers and other semiconductor devices. He continues to reside in New Jersey.

The impact of Boyle and Smith's CCD innovation has also been recognized with the following awards: the Franklin Institute's Stuart Ballantine Medal in 1973, the IEEE's 1974 Morris Liebmann Award in 1974, the C&C Prize from Japan in 1999, the IEEE Device Research Conference Breakthrough Award in 1999, the Photographic Society of America's Progress Medal award, and the 2001 Edwin Land Medal.

Endowed by the Charles Stark Draper Laboratory, Inc., the Draper Prize recognizes outstanding engineering achievements that have contributed to the welfare and freedom of humanity. The first Draper Prize was awarded in 1989 to Jack S. Kilby and Robert N. Noyce for their invention of the integrated circuit. Recipients of the prize have included the inventors of the turbojet engine, the developer of FORTRAN computer language, and the developers of satellite communications. [•]



Willard Boyle and George Smith with their first CCD camera in 1974  
(Photo courtesy of Lucent Technologies Bell Labs)