National Inventors Hall of Fame®

Computing Industry

It has been 50 years since Intel's Gordon Moore predicted that the number of transistors on a chip would double every couple of years, but "Moore's Law," as it was deemed many years ago, still holds true. The $335 billion dollar chip industry (according to the Semiconductor Industry Association) has not only led to huge innovations in modern electronics and driven the United States economy, but it continues to have a direct impact on the computing industry, beyond just chip technology, that has also influenced Internet and communications technologies.

Moore's Law is a catalyst that breathes new life into the broader information industry, an industry that is featured in *U.S. News and World Report's* Best Jobs of 2015 and brings change and business acumen to our nation's enterprise. The development of new and better tools and systems are preparing us for the future and also making sure that the United States continues to be an innovation and information leader.

This year, the National Inventors Hall of Fame will induct three information technology innovators in computing, Internet development, and communications for their achievements and world-renowned breakthroughs.

Victor B. Lawrence

Electrical engineer Victor Lawrence has improved transmission for the modern Internet, made high-speed connections more universally available, and stimulated the growth of the global Internet. His work has advanced data encoding and transmission, modem technology, silicon chip design, ATM switching and protocols, DSL, speech and audio coding, and digital video.

Lawrence spent much of his career at Bell Laboratories. While there, he streamlined signal travel while using less bandwidth, allowing more data to be transmitted over existing phone networks, and his chipsets formed the heart of voice-band modems and DSL technologies, both of which used telephone lines. Lawrence was the lead engineer of AT&T's 2.4k bps full-duplex modem, and his innovations pushed the evolution of modems to 56k bps. By enabling the high-speed transmission of more data, Lawrence helped turn the Internet into a global industry useful for more than simple text-based functions. He also developed methods of including more information in a signal, which facilitated the introduction of digital video and radio, and the development of high-definition and digital television.

Born in Ghana, Lawrence received B.Sc., DIC, and Ph.D. degrees in electrical engineering from the University of London. After many years at Bell Labs, Lawrence is now on the faculty of Stevens Institute of Technology. An advocate of bringing Internet access to the world's poorest countries, Lawrence has spearheaded efforts to lay high-capacity fiber optic cable along the west coast of Africa.

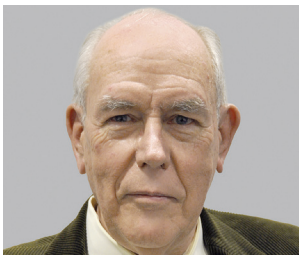
Radia Perlman

Radia Perlman has played a key role in driving the growth and development of the Internet. Her best known contribution came in 1985: the spanning-tree protocol (STP), which transformed Ethernet from a technology limited to a few hundred nodes confined in a single building, into a technology that can create large networks with hundreds of thousands of nodes spread over a large area.

Another of Perlman's notable contributions is making Internet routing reliable and scalable. Internet routes are computed with the collaboration of many machines, and Perlman's techniques make the process efficient, self-organizing and resilient even if not all the participants are behaving properly.

Perlman received her B.S., M.S., and Ph.D. degrees from MIT. She has received many awards, including induction into the National Academy of Engineering, the Internet Hall of Fame, and lifetime achievement awards from ACM's SIGCOMM and Usenix.

Perlman holds over 100 U.S. patents. She is the author of *Interconnections*, a widely read text on network routing and bridging and coauthor of *Network Security,* a text on cryptography and how it is used in networks. She is currently a Fellow at EMC Corporation.



Ivan E. Sutherland

In 1963, Ivan Sutherland engineered a revolution in computer graphics with his highly interactive program Sketchpad. It enabled users to design and draw in real time directly on the computer display, using a light pen. Among other innovative features, Sketchpad allowed users to manipulate, duplicate, store and recall drawings for future enhancements.

The genesis of a multibillion-dollar industry, Sketchpad pioneered the way for human-computer interaction; it was the forerunner of the graphical user interface (GUI) programs found today in all computers, gaming devices, MP3 players and smartphones. Sutherland is widely regarded as the "father of computer graphics."

In 1967 — as an associate professor of electrical engineering at Harvard University — Sutherland devised the first virtual reality head-mounted display system with student Robert Sproull. In 1968, with David Evans, Sutherland formed Evans & Sutherland (E&S), a manufacturer of computer graphics equipment. E&S pioneered the use of computer graphics for training commercial pilots.

Sutherland received his B.S. from Carnegie Tech, his M.S. from Caltech, and his Ph.D. from MIT. Today, Sutherland leads research in asynchronous systems — computers with no global clock — at Portland State University's Asynchronous Research Center, which he founded in 2008 with Marly Roncken.