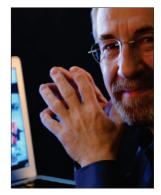# The 2013 Virtual Reality Career Award

Henry Fuchs

The 2013 Virtual Reality Career Award goes to Henry Fuchs, The University of North Carolina at Chapel Hill, for his lifetime contributions to research and practice in virtual environments, telepresence, and medical applications.

Since the 1970s, Henry Fuchs has made pioneer contributions to many of the technologies needed to enable virtual and augmented reality: automatic construction of 3D models and scenes, fast rendering algorithms (BSP Trees), graphics hardware (Pixel-Planes), large-area tracking systems (HiBall), optical and video see-through head-mounted displays. Many of these advances were inspired by demanding applications such as augmenting visualization for surgical assistance (by merging real and virtual objects) and teleimmersion for remote medical consultation. He continues to innovate within a multi-national telepresence research center with sites at ETH Zurich, NTU Singapore, and UNC Chapel Hill. The IEEE VGTC is pleased to award Henry Fuchs the 2013 Virtual Reality Career Award.

Henry Fuchs
The University of North Carolina at Chapel Hill
Award Recipient 2013

Biography

Fuchs is the Federico Gil Distinguished Professor of Computer Science and Adjunct Professor of Biomedical Engineering at the University of North Carolina at Chapel Hill. Born in 1948 in Tokaj, Hungary, he escaped with his family in wake of the 1956 Hungarian revolution, emigrating to the USA in 1957. He received a BA in Information and Computer Science from University of California at Santa Cruz in 1970, drawn to computer science by teachers and computer pioneers David Huffman and Harry Huskey.

Ivan Sutherland's great 1968 head-mounted display paper attracted Fuchs to graduate study at Utah, and Sutherland's vision of immersion in virtual worlds via see-through displays in tracked eyeglasses continues to inspire much of Fuchs' work. He received a PhD from the University of Utah in 1975. His dissertation, on the construction of surface models of 3D objects by laser scanning, was supervised by Robert Plummer, with Ivan Sutherland, Elliott Organick, and Steven Coons.

In 1975 he joined the new computer science faculty at the University of Texas at Dallas, and in 1978 moved to UNC Chapel Hill, starting a long-term collaboration with Fred Brooks in what is now called virtual environments, and one with Steve Pizer on 3D medical imaging and displays. Carver Mead's vision of a "tall-thin" designer, enabled by Lynn Conway's single-semester IC design course, inspired Fuchs to venture into custom integrated circuit design. Among the results were a series of graphics engines, Pixel-Planes, each of which was among the fastest graphics engines of its day. These embodied new algorithms. They were designed and built with partner John Poulton and other faculty and student colleagues. The prototypes of the full-scale versions, Pixel-Planes 4 and 5 and their successor, PixelFlow, ran at UNC for many years, enabling a variety of medical, scientific, and architectural real-time applications in virtual and augmented environments.

These VR applications also inspired concurrent work in wide-area tracking systems, such as the inside-out optical tracking dissertation research of student and colleague Gary Bishop, and (a decade later) Bishop's student and colleague Greg Welch. The commercialized HiBall™ wide-area tracker uses celestial navigation with cooperating infrared "stars" to deliver exceptional translational and rotational precision, low area-independent latency, and low marginal cost for area expansion.

The VR applications also drove work on both optical and video see-through head-mounted displays, including one of the first video see-through displays with properly matched user and camera viewpoints (designed by D'nardo Colucci). Several of the innovations have been commercialized by 3rdTech and InnerOptic, and licensed by HP, Ivex, and others.

Fuchs is the recipient of the 1997 Satava Award of the Medicine Meets Virtual Reality Conferences, the 1992 ACM-SIGGRAPH Achievement Award, and the 1992 Academic Award of the National Computer Graphics Association. He is a member of the National Academy of Engineering and a fellow of the American Academy of Arts and Sciences.

Award Information

The IEEE VGTC Virtual Reality Career Award was established in 2005. It is given every year to an individual to honor that person's lifetime contributions to virtual & augmented reality. VGTC members may nominate individuals for the Virtual Reality Career Award by contacting Arie Kaufman at vgtc-vr-awards@vgtc.org.