

For the invention of innovative imaging techniques and their widespread use in digital photography and computer vision



Dr. Shree K. Nayar

Positions and Organizations :

T. C. Chang Professor of Computer Science, Columbia University
Director, Columbia Imaging and Vision Laboratory

Degree : Ph.D. in Electrical and Computer Engineering
(Carnegie Mellon University (CMU), 1991)

Date of Birth : January 15, 1963

Brief Biography :

- 1984 B.S., Electrical Engineering, Birla Institute of Technology
- 1986 M.S., Electrical and Computer Engineering, North Carolina State Univ.
- 1986 Graduate Research Assistant, The Robotics Institute, CMU
- 1989 Visiting Research Scientist, Hitachi, Ltd., Yokohama
- 1990 Ph.D., Electrical and Computer Engineering, The Robotics Institute, CMU
- 1991 Assistant Professor, Dept. of Computer Science, Columbia Univ.
- 1995 Associate Professor, Dept. of Computer Science, Columbia Univ.
- 1996 Professor, Dept. of Computer Science, Columbia Univ.
- 2002 T. C. Chang Endowed Chair Professor, Dept. of Computer Science, Columbia Univ.
- 2009 Department Chair, Computer Science, Columbia Univ.
- 2018 Director, NYC Research, Snap Inc.

Main Awards and Honors:

- 1990 David Marr Prize
- 1991 NSF National Young Investigator Award
- 1992 David and Lucile Packard Fellowship
- 1994 NTT Distinguished Scientific Achievement Award
- 1995 David Marr Prize
- 1995 Keck Engineering Teaching Excellence Award
- 2006 Great Teacher Award, Columbia Univ.
- 2009 Alumni Achievement Award, CMU
- 2014 Appreciation Honor for Contributions to Computational Imaging, SONY
- 2019 Helmholtz Prize, Computer Vision Foundation
- 2019 IEEE PAMI Distinguished Researcher Award, IEEE Computer Society
- 2021 Funai Achievement Award, Information Processing Society of Japan
- 2021 SPIE Luminary, The International Society of Optics and Photonics

Others: Member of National Academy of Engineering, American Academy of Arts and Sciences, National Academy of Inventors, Indian National Academy of Engineering

Main Achievements :

Conventional cameras use a lens and an image sensor — film in the past, and now CCD and CMOS sensors — to record images. Professor Nayar has redefined the camera and its capabilities through his innovative and pioneering work in the field of computational imaging, which uses optical coding

followed by computational decoding to produce new forms of visual information. Over the last three decades, he has developed computational cameras for wide angle, high dynamic range, extended depth of field, multispectral, ultra-high resolution (gigapixel) and depth (3D) imaging. This new class of cameras have not only empowered computer vision systems but also impacted the way humans communicate with each other. Professor Nayar's contributions are described in over 300 scholarly publications and 100 patents.

His work on "shape from focus" has led to a new line of products for digital 3D microscopy. His omnidirectional (360 degree) cameras are being used for both communication and security applications. His "assorted pixel" technology, which enables a compact camera module to capture photos with unprecedented dynamic range is now incorporated into the most advanced image sensors. These image sensors are used in many of today's popular mobile devices. It is estimated that there are over 1 billion users of Nayar's assorted pixel technology.

There are many other examples of Professor Nayar's work, such as an imaging technique that can "see" beneath the surfaces of objects, enabling vision systems to distinguish between man-made and natural materials. More recently, he has focused on the creation of futuristic cameras, such as self-powered cameras that do not require a power supply but instead use energy that is harvested from the light received from the scene that is being photographed, as well as flexible cameras that can be bent freely.

For his outstanding track record in both academic research and practical applications, Professor Nayar has received many awards including the IEEE PAMI Distinguished Researcher Award, the most prestigious award in the field of computer vision. He was elected to the National Academy of Engineering, the highest honor for an engineer in the United States, at the young age of just 45 years. He has also been elected to the American Academy of Arts and Sciences, the National Academy of Inventors and the Indian National Academy of Engineering.

Professor Nayar also designed an educational camera for inspiring students to learn a wide range of science and engineering concepts. The camera, called "Bigshot," comes as a kit that is assembled in several stages, giving students hands-on exposure. Once assembled, the camera is used to teach students photography. Bigshot has been used by over 100,000 children around the world, including students in India, Vietnam, Japan and the U.S. Several school systems and non-profit organizations have launched educational programs based on Bigshot to inspire children in under-served communities. For his exceptional talents as an educator, Professor Nayar received the prestigious Great Teacher Award from Columbia University.

Professor Shree Nayar, has made remarkable contributions through the invention of novel imaging systems and their widespread use in digital photography and computer vision. In recognition of these contributions, he is hereby awarded the Okawa Prize.