

Citation

For far-reaching and pioneering research achievements in computer vision, artificial intelligence, and robotics, and the outstanding and innovative teaching that has produced the next generation of leaders in these fields.



Dr. Takeo Kanade

Position and Organization :

Carnegie Mellon University (Pittsburgh, Pennsylvania, USA)
 U.A. and Helen Whitaker University Professor of Computer Science and Robotics
 Director, Quality of Life Technology Engineering Research Center
 National Institute of Advanced Industrial Science and Technology, (Tokyo, Japan)
 Director, Digital Human Research Center

Doctorate: Ph.D. in Electrical Engineering (Kyoto University, 1974)

Date of Birth: October 24, 1945

Brief Biography :

- 1968 B.S., Kyoto University
- 1970 M.S., Electrical Engineering, Kyoto University
- 1974 Ph.D., Electrical Engineering, Kyoto University
- 1973 Assistant Professor, Department of Information Science, Kyoto University
- 1976 Associate Professor, Kyoto University
- 1980 Senior Research Computer Scientist, Computer Science Department and Robotics Institute, Carnegie Mellon University (CMU)
- 1982 Associate Professor, CMU
- 1985 Full Professor, CMU
- 1992 Director, Robotics Institute, CMU
- 1993 U.A. and Helen Whitaker Professor, CMU
- 1998 U.A. and Helen Whitaker University Professor, CMU
- 2001 Director, Digital Human Research Center, the National Institute of Advanced Industrial Science and Technology, Tokyo
- 2006 Director, Quality of Life Technology Engineering Research Center, CMU

Main Awards and Honors :

- 1990 Marr Prize Award
- 1995 Joseph Engelberger Award
- 2000 C&C Prize, NEC C&C Foundation
- 2003 Achievement Award, Japanese Society for Artificial Intelligence
- 2004 FIT Achievement Award, Funai Foundation for Information Technology
- 2006 Longuet-Higgins Prize
- 2007 Pioneer Award, IEEE Robotics and Automation Society
- 2007 Azriel Rosenfeld Lifetime Accomplishment Award, IEEE Pattern Analysis and Machine Intelligence TC

Foreign Associate, National Academy of Engineering (USA)
 American Academy of Arts and Sciences member
 Fellows of IEEE, ACM, AAAI, Institute of Electronics, Information and Communication Engineers of Japan, and the Robotics Society of Japan

Main Achievements :

Dr. Kanade is the originator of many basic algorithms that are widely used today in a variety of fields, including computer vision, artificial intelligence, and robotics. His paradigm-shift approaches to research problems led to ground-breaking applications of these technologies to intelligent robots and visual media systems.

He graduated with a Ph.D. degree from Kyoto University. After holding an Associate Professor position there for 6 years, he moved to Carnegie Mellon University in 1980. From this new base in the United States, he has carried out most of his research pursuits and educational endeavors. In 1992, he was appointed Director of the Robotics Institute at Carnegie Mellon, taking on a central role in a variety of robotics research projects. Under his leadership, the Institute became the world's most

famous research organization in the robotics field, engaging well over 200 researchers.

In 1998, he rose to the school's top faculty rank of University Professor. Then in 2006 he became the founding Director of the Quality of Life Technology Engineering Research Center. This center is developing intelligent systems that augment the mind and body functions of human beings, the major aim being to help older people and people with disabilities to live independently.

Among his numerous high-impact achievements, the development of the gradient-based image feature tracking algorithm (often called the Lucas-Kanade tracker) made a significant and long-lasting contribution to the field of motion image analysis. This foundational algorithm for tracking the motion of a given point in successive images is the basis of most motion image analysis programs today, including MPEG encoders.

As an example of system research, he proposed the use of cameras to guide unmanned vehicles. In a DARPA (Defense Advanced Research Projects Agency) project that began in the 1980s to study autonomous vehicles, he developed a series of vision-guided driverless navigation robot systems called NavLab (Navigation Laboratory). The leading-edge technologies developed for these systems include outdoor scene recognition, road tracking, and detection of pedestrians, vehicles and obstacles. In 1995, the NavLab-5 autonomous vehicle made a successful journey across the continental United States, traveling at a speed of over 100 km/h and covering a distance of approximately 4,800 km. Today, the technologies for assisting drivers by means of computer vision are starting to be applied to commercial uses, such as run-off-road collision prevention, and pedestrian and vehicle sensing systems.

Since 1995, Dr. Kanade has been conducting research on a brand-new type of visual media, which he calls "virtualized reality." He proposed using multiple robotics-controlled cameras to capture an event from all angles, over a 360 degree panorama, and then processing the images to let people review the event from any desired vantage point. He developed the theory and carried out various experiments over the years to test the concept. For the TV broadcast of the 2001 Super Bowl football game, he developed the "EyeVision" system, which used 33 robotically-controlled cameras to produce enhanced video images that put the viewer right into the thick of the action. These images were seen by a worldwide audience of a billion people. The system was the forerunner of the multi-camera visual media, now common on TV.

In Japan, Dr. Kanade founded the Digital Human Research Center at the National Institute of Advanced Industrial Science and Technology in 2001, and has been serving as the Center Director. The research there under his direction is to develop computer models of human functions, and to apply these models to describe, analyze, simulate, and predict human functions and behavior.

Using his innovative approaches to teaching, Dr. Kanade has dedicated himself to industry-academia collaboration by training a large number of researchers and engineers of the next generation in academia and industry in the fields of computer science and robotics, both in the United States and Japan.

In honor of these and many achievements, Dr. Kanade was the youngest Foreign Associate ever elected to the National Academy of Engineering. He was also made a fellow of multiple U.S. and Japanese academic societies, including the ACM, IEEE, AAAI, Institute of Electronics, Information and Communication Engineers, and the Robotics Society of Japan. His many awards include the Joseph Engelberger Award, IEEE Robotics and Automation Society (RAS) Pioneer Award, and IEEE PAMI -TC Azriel Rosenfeld Lifetime Accomplishment Award.

For far-reaching and pioneering research achievements in computer vision, artificial intelligence, and robotics, and the outstanding and innovative teaching that has produced the next generation of leaders in these fields, Dr. Takeo Kanade is hereby awarded the Okawa Prize.