Takeo Kanade

Takeo Kanade is the U. A. and Helen Whitaker University Professor of Computer Science and Robotics. He received his Doctoral degree in Electrical Engineering from Kyoto University, Japan, in 1974. After holding a faculty position in the Department of Information Science, Kyoto University, he joined Carnegie Mellon University in 1980. He was the Director of the Robotics Institute from 1992 to 2001, and a founding Director of Quality of Life Technology Research Center from 2006 to 2012. In Japan, he founded the Digital Human Research Center in Tokyo and served as the founding director from 2001 to 2010.

Dr. Kanade works in multiple areas of robotics: computer vision, multi-media, manipulators, autonomous mobile robots, medical robotics and sensors. He has written more than 400 technical papers and reports in these areas, and holds more than 20 patents. He has been the principal investigator of more than a dozen major vision and robotics projects at Carnegie Mellon.

Dr. Kanade has been elected to the National Academy of Engineering and the American Academy of Arts and Sciences. He is a Fellow of several professional organizations, including the IEEE, the ACM, and the American Association of Artificial Intelligence (AAAI). Awards he received include the Franklin Institute Bower Prize, ACM/AAAI Allen Newell Award, Okawa Award, NEC Computer and Communication Award, Tateishi Grand Prize, Joseph Engelberger Award, IEEE Robotics and Automation Society Pioneer Award, and Azriel Rosenfeld Lifetime Accomplishment Award of International Conference of Computer Vision.
.

TAKEO KANADE
CURRICULUM VITAE

Current Position

U. A. and Helen Whitaker University Professor of Computer Science and Robotics
Carnegie Mellon University

Personal Information

Citizenship: Japan
Born: October 24, 1945; Hyogo, Japan

Business Address:
Carnegie Mellon University
Robotics Institute
Pittsburgh, PA 15213, USA
+1-412-268-3016

Home Address:
62 Nishi Shin Machi
Sasayama-City
Hyogo, Japan
+81-79-558-8702

Education

- Kyoto University 1964-1968 B.E. Electrical Engineering
- Kyoto University 1968-1970 M.E. Electrical Engineering
- Kyoto University 1970-1973 Ph.D. Electrical Engineering

Honorary Degree

- Nagoya Institute of Technology, November 2, 2006
- Nara Institute of Science and Technology, November 1, 2011

Positions Held

- Director, Quality of Life Technology Engineering Research Center, 2006 to 2012
- University Professor in Computer Science and Robotics, 1998 to present.
- U.A. and Helen Whitaker Chaired Professor in Computer Science and Robotics, 1993 to present
- Special Fellow, Digital Human Research Center, AIST, Japan, 2010 –
- Director, Digital Human Research Center, AIST, Japan, 2001 to 2010
- Director, The Robotics Institute, Carnegie Mellon University; 1992 to 2001
- Professor of Computer Science and Robotics, Carnegie Mellon University; 1985 to 1994
- Associate Professor with Tenure, Department of Computer Science and Robotics Institute, Carnegie Mellon University; 1982 to 1985

- Senior Research Scientist, Department of Computer Science and Robotics Institute, Carnegie Mellon University; 1980 to 1982
- Associate Professor, Department of Information Science, Kyoto University, Japan; 1976 to 1980
- Assistant Professor, Department of Information Science, Kyoto University, Japan; 1973 to 1976

Current Research Interest and Responsibilities

- Computer Science, Artificial Intelligence, Image Understanding, Robotics, Vision, Autonomous Systems, Manipulator, Navigation, Sensors, Medical Imaging, Graphics, Quality of Life Technology.

Honors and Awards

- National Academy of Engineering (NAE), 1997
- American Academy of Arts and Sciences (AAAS), 2004
- Fellow, Association for Computing Machinery (ACM), 1999.
- Fellow, Institute of Electrical and Electronics Engineers (IEEE), 1992.
- Fellow, American Association for Artificial Intelligence (AAAI), 1990.
- Fellow, The Robotics Society of Japan
- Fellow, Institute of Electronic and Communication Engineers of Japan (ECEJ)
- Franklin Medal and Bower Award for Achievement in Science for "Visionary leadership and scientific accomplishments in the design of perceptual robotic algorithms and systems that function in the physical world", The Franklin Institute, 2008
- ACM/AAAI Allen Newell Award, For "Fundamental contributions to research in computer vision and robotics for applications to driving, 3D vision, and quality of life technology and for promoting the interaction between computer science and other disciplines, most notably robotics", June, 2011.
- Okawa Prize, 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 leaders in these fields", The Okawa Foundation for Information and Telecommunications, 2007
- C&C Prize. "Contribution to the Development of Multi-media through the Fundamental and Broad Advancement of Robotics and Computer Vision", C &C Promotion Foundation, 2000
- Inaugural Tateisi Grand Award and Prize. "Pioneering contributions to digital human technologies that enhance people's lives, " The Tateisi Science and Technology Foundation, May 2010.
- Azriel Rosenfeld Lifetime Achievement Award for Computer Vision Research, IEEE Pattern Recognition and Machine Intelligence, 2007
- IEEE Robotics and Automation Society Pioneer Award, in recognition of "Outstanding Contributions to the Fields of Computer Vision, Manipulation, Autonomous Mobile Robots and Medical Robotics," 2007
- Career Accomplishment Award, The Japan Society of Artificial Intelligence, June 2003.

- Funai Accomplishment Award, Federation of Information Technology, September 2004
- Joseph F. Engelberger Award, Robotics Industry Association, 1995
- Niwa-Takayanagi Award “Pioneering research and development of three-dimensional visual media and its real-world applications (3 次元映像メディアの先駆的研究開発と実システムへの展開に対する貢献)” Institute of Image Information and Television Engineers, June 2009
- JARA Award for Research and Development, Japan Association of Robotic Industry, October 1996.
- Allen Newell Medal for Research Excellence, "For research spanning medicine and robotics, leading to the development of image-guided surgical navigation systems such as HipNav that improve patient outcome by augmenting surgeon skill." Carnegie Mellon University 2001
- Takumi Award (匠賞) for an innovative technologist for media creation, Asia Graph Tokyo, October 2008.
- Longuet-Higgins Prize 2008 for Lasting Contribution in Computer Vision with Henry Schneiderman ("Probabilistic modeling of local appearance and spatial relationships for object recognition" published in Proceedings of CVPR 1998) for "A significant advance in object recognition through probabilistic modeling and multiple-view training, yielding a state-of-the-art face detection technique”), June 2008
- Longuet-Higgins Prize 2006 for Lasting Contribution in Computer Vision “Neural Network-Based Face Detection” published in published in Proceedings of CVPR 1996 with Henry Rowley and Shmeet Rahul), 2006.
- Best Paper Award, “Dense 3D Face Alignment from 2D Video in Real Time” (with Laszlo Jeni and Jeffrey Cohn), 11 th IEEE International Conference on Automatic Face and Gesture Recognition, Ljubljana, Slovania, May 4-8, 2015.
- Best Paper Award, “Visual Odometry by Multi-frame Feature Integration (with Akihiro Yamamoto, Hernan Badino), IEEE Workshop on Computer Vision for Autonomous Driving, ICCV Sidney, Dec.4, 2013
- Best Application Paper Award, “A Head-Wearable Short-Baseline Stereo System for the Simultaneous Estimation of Structure and Motion” (with Hernan Badino), IAPR Conference on Machine Vision application, June 14, 2011
- Lockheed-Martin Best Paper Award, "A Robust Subspace Approach to Layer Extraction" (with Qi Fa Ke) at IEEE Workshop on Motion and Video Computing, December 4-5, 2002, Orlando, Florida.
- Best Paper Award, ,"Image Segmentation Using Iterated Graph Cuts Based on Multi-scale Smoothing " (with T. Nagahashi and H. Fujiyoshi) Information Processing Society of Japan, Journal of IPSJ-TCVIM0102004, Vol.1 No.2, July 2008.
- Best Paper Award, “Multi-Subregion Based Probabilistic Approach Toward Pose Invariant Face Recognition” (with Akihiko Yamada), at IEEE International Symposium on Computational Intelligence in Robotics and Automation, June 16-20, 2003 (CIRA2003), Kobe, Japan
- Best paper in the basic science category, "Ultrasound Based Registration of the Pelvic Bone Surface for Surgical Navigation" (with Devin V. Amin and others), International Computer Assisted Orthopedic Surgery Conference (CAOS), February 7-10, 2001, Davos, Switzerland.
- The Best Paper Award, “Development of a Video-Rate Stereo Machine” (with Makoto Kimura and others), Robotics Society of Japan, 1998

- Otto Aufranc Award, The Hip Society, "An Image Guided Surgical Navigation System for the Accurate Measurement and Alignment of Acetabular Implants" (with DiGioia, Jaramez, Blackwell et. al.), 1998
- Marr Prize, "Shape from Inter-reflections", S. K. Nayar, K. Ikeuchi, and T. Kanade, The Third International Conference on Computer Vision (ICCV90), December 1990.
- Yokogawa Prize, International Conference on Multi Sensor Fusion and Integration for Intelligent Systems, "Recovery of Dynamic Scene Structure from Multiple Images Sequences" (with Peter Rander, and PJ Narayanan), Washington DC, Dec 9-11, 1996
- Memorial Paper Award for the 25th Year of Information Processing Society of Japan, "Stereo by Intra- and Inter-Scanline Search Using Dynamic Programming" (with Y. Ohta), 1985. 情報処理学会創立 25 周年記念論文賞
- The Best Paper Award, "Modeling the Product Manifold of Posture and Motion," Ankur Datta, Yaser Sheikh, Takeo Kanade, Second IEEE International Workshop on Tracking Humans for the Evaluation of their Motion in Image Sequences (THEMIS), 2009
- Best Paper Award (Short paper session), "Automatic Acquisition of a 3D Eye Model For a Wearable First-Person Vision Device", Akihiro Tsukada and Takeo Kanade, ETRA 2012 (Eye tracking & research applications), March 28-30, 2012, Santa Barbara, CA.
- The Best Video Award (with Itaru Kitahara and Yuichi Ohta), MIRU 2000, Japan
- Aero Space Laurels, Aviation Week & Space Technology, for "substantial contributions to the global field of aerospace in 1997 in the area of electronics," 1998
- "Virtualized Reality" selected as one of the top 100 science stories in 1997 by Discover Magazine, Jan 1998.
- Selection as the author of one of the most influential papers that appeared in the Artificial Intelligence journal in the last ten years, 1992
- AT & T Foundation Special Grant Award: October 1988
- Hoso Bunka Kikin Foundation Award 1994
- AVIRG Award: Audio Visual Information Research Group in Japan, 1980

Membership in Professional Societies

- Association of Computing Machinery (ACM), Fellow
- Institute of Electrical and Electronics Engineers (IEEE), Fellow
- American Association for Artificial Intelligence (AAAI), Founding Fellow
- The Robotics Society of Japan, Fellow
- Institute of Electronics and Communication Engineers of Japan (IECEJ), Fellow

Professional Activities

Advisory Boards

- Member, Board of Visitors, Army Research Laboratories, 2012
- Member, Board of Visitors, School of Health and Rehabilitation Science, University of Pittsburgh, 2008-2013
- Member, Scientific Advisory Panel of Toyota Technical Institute-Chicago, 2005-

- Member, Technical Divisions Advisory Board, Jet Propulsion Laboratory, California Institute of Technology, 2003-
- Chairperson, Robotics Council, National Science Foundation, 2001 –2003
- Member, National Research Council Committee on Frontiers at Interface between Computing and Biology, 2000-2001
- Member, Transforming Healthcare Panel (Sub panel– Presidential Information Technology Advisory Committee), 2000
- National Research Council, Steering Group and Co Chair of Session 2, Study Group (for Space Studies Board) on Biology-Based Technology to Enhance The Human Presence in Extended Space Exploration, 1997
- Member, Board of Academic Advisors, Ritsumeikan Asia Pacific University, 1998-
- DARPA ISAT Summer Study Group Chairman on "Paket Robotics", 1996
- Council and Treasurer, International Foundation for Robotics Research 1993-
- National Advisory Highway Safety Council (NAHSC), 1994-1995
- Aeronautics and Space Engineering Board (ASEB), National Research Council, 1992-1996.
- Advisory Board, Canadian Institute of Advanced Research (CAIR), Artificial Intelligence and Robotics Program, 1991-1993
- AdCom Member, IEEE Robotics and Automation Society, 1989-1991
- NASA Advanced Technology Advisory Committee (Congressionally mandated committee), January 1988 - 1990.
- NASA-JPL Telerobotics Testbed Critical Design Review Panel, December 1988.
- DARPA ISAT Summer Study Group, Chairman of Working Group on Vision,1987.
- National Research Council Research Briefing Panel on Computer Vision and Pattern Recognition, 1985.
- FASAC (Foreign Applied Sciences Assessment Center) Panel, Science Applications International, 1985-84.
- NASA-JPL Telerobotics Technology Advisory Committee, 1986-88.

Editorial Boards

- Editorial Advisory Board, *International Journal of Humanoid Robotics (IJHR),* July, 2003 – July, 2006.
- Founding Chief Editor, *International Journal of Computer Vision*, Kluwer Publisher, 1985-2000.
- Executive Board, *Medical Image Analysis,* Oxford University Press, 1996-
- Editorial Board, *International Journal of Robotics Research*, MIT Press, 1995-
- Editorial Board, *Computer Vision, Graphics, and Image Processing,* Academic Publisher, 1987-.
- Editorial Board, *Robotics and Autonomous Systems,* Elsevier Publisher, 1995-.
- Editorial Advisory Committee, Telemedicine and Virtual Reality, 1996-
- Main Editor, Series on Robotics, Kluwer Publisher, November 1983-.
- Editor, IEEE Trans. PAMI Special Issue on Physical Modeling in Computer Vision, June 1991.
- Editorial Advisory Board, *International Journals on Robotics and Computer-Integrated Manufacturing*, (October 1983-).

- Editor, Research Notes in Artificial Intelligence, Pitman Publishing Ltd., July 1983-1985.
- Editorial Board, *Lecture Notes in Computer Science*, 2003.

Conference Chairman

- General Chair, IEEE International Conference on Computer Vision (CVPR), Colorado, June 2011.
- General Chair, International Conference on Computer Vision, Minneapolis, June 2007.
- Chairman, Audio- and Video-based Biometric Person Authentication (AVBPA), Rye Brook, NY, July 20-22, 2005
- Chairman, Medical Robotics Technology Workshop, Invitation only workshop under auspices of International Advanced Robotics Program (IARP), Hidden Valley, PA, May 20-22, 2004
- Co-Organizer, Dagstuhl Seminar, Saarbreuchen, Germany, October 24-28, 1994.
- Co-Chair, First International Symposium on Medical Robotics and Computer-Assisted Surgery, Pittsburgh, PA, September 22-24, 1994.
- Chairman, International Symposium on Robotics Research, Pittsburgh, PA, October 2-5, 1993.
- Chairman, NATO Advanced Research Workshop on Mobile Robots, Lisbon, Portugal, May 11-15, 1987.
- Program Chairman, 1986 International Conference on Intelligent Autonomous Systems, Amsterdam, The Netherlands, December 8-11, 1986.
- General Co-Chairman, IEEE International Conference on Robotics and Automation '86, San Francisco, CA, April 1986.
- Workshop Chairman, NSF International Workshop on Sensing and Control, (with Marc Raibert and Art Sanderson), Honolulu, April 1-2, 1986.
- General Chairman, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) '83, Washington DC, June, 1983.
- Committee chairman, Committee on robotics, IEEE Computer Society, Pattern Analysis and Machine Intelligence, 1982-1983.

Invited Keynote Lectures at Major Conferences

- 21st International Conference on Pattern Recognition (ICPR 2012), "First-Person Vision" November 11-15, 2012, Tsukuba Science City, JAPAN
- 8th International Conference on Smart Homes and Health Telematics (ICOST) 2010, "Quality of Life Technology: Challenges and Opportunities," June 22-24, 2010, Seoul, Korea.
- Computing in the 21st Century Conference 2009, "Large-Scale and Complete Analysis of Cells in Time-Lapse Microscope Images to Aid Biological Sciences," November 4-6, 2009, Tokyo and Kyoto, Japan.
- International Conference on Image Processing (ICIP) 2009, "Tracking a Large Number of Migrating and Proliferating Cells in Time-Lapse Microscopy Imagery," November 7-11, 2009, Cairo, Egypt.
- International Conference on Intelligent Robots and Systems (IROS) 2008, "Visual Processing and Understanding of Human Faces," September 22-26, 2008, Nice, France.

- SIGGRAPH 2008, “My personal take on the last 30 years in robotics and vision”, (one of the three keynotes at the main conference), August 11-14, 2008, Los Angels.
- International Conference on Biometrics (ICB), “Detecting and Tracking People for Biometrics,” Seoul, Korea, August 27-29, 2007.
- Human-Computer Interaction (HCI) International 2007 Conference, “Digital Human Modeling and Quality of Life Technology,” Beijing, P.R. China, July 22-27, 2007.
- The Onassis Foundation Science Lecture Series, The 2006 Lectures in Computer Science: Robots Intelligently Interacting With People, "Robotics: Theory, Technology and Excitement," Heraklion, Crete, Greece, July 24, 2006.
- Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) 2005, “Robotics Technologies for Quality of Life,” Atlanta, GA, June 24, 2005
- Asian Conference on Computer Vision (ACCV2004), “Analysis of Facial Images,” Jeju Island, Korea, January 29, 2004
- 18-th International Joint Conference on Artificial Intelligence (IJCAI) 2003, “Computer Vision: AI or Non-AI Problem,” Acapulco, Mexico, August 9-15, 2003
- Microsoft Research Asia, “Video Capture and Processing of a Dynamic Scene,” Beijing, Republic of China, October 2002
- The IEEE International Conference on Image Processing (ICIP), “Subspace Methods for Image Analysis,” Rochester, NY, September 2002.
- Sixth International Conference on Control, Automation, Robotics, and Vision (ICARV ‘00), “Robotics: Renewed Opportunities and Approaches,” Singapore, December 5-8, 2000
- International Conference on Pattern Recognition, “Virtualized Reality: Digitizing a 3D Time-Varying Real Event As Is and in Real Time”, Barcelona Spain, September 4, 2000
- International Conference of Robotics and Automation 2000, "Vision - Enabling Robots to Sense, Control and Interact", San Francisco, April 24, 2000.
- International Conference on Robotics and Automation (ICRA) 2000, Plenary Session Talk, ”Vision – Enabling Robots to Sense, Control and Interact,” Special Session Talk, “Robotics: The 20th Century and Beyond,” San Francisco, CA, April 23, 2000
- Fourth Asian Conference on Computer Vision (ACCV 2000), Invited Talk, “Real Time Vision – Interaction Among Algorithms, Hardware and Control,” Taipei, Taiwan, January 9-11, 2000
- 30th International Symposium on Robotics (ISR), “Virtualized Reality,” Tokyo, Japan, October 27, 1999
- The First International Symposium on Mixed Reality (ISMR ’99), “The 3D Dome: Digitizing a 3D Time-Varying Event into a Computer,” Yokohama, Japan, March 9-11, 1999
- 4th International Conference on Virtual Systems and MultiMedia (VSMM 1998), “Techniques for 3D Digitization of a Scene in its Totality: Static or Dynamic,” Gifu, Japan, November 18-20, 1998
- International Conference on Multi Sensor Fusion and Integration for Intelligent Systems, "Computational Sensors", Washington D.C., Dec 10, 1997
- Super Computing ‘96, "3D Dome: Virtualizing Reality into a 3D Model", November 17-22, 1996, Pittsburgh, PA.

- 4th European Conference on Computer Vision (ECCV 1996), Workshop, "Virtualized Reality: Putting Reality into Virtual Reality," Cambridge, UK, April 13, 1996
- International Symposium on Industrial Robotics (ISIR '92), "Computational Sensors: Integration of Transducing and Processing", Barcelona, Spain, October 6-9, 1992.
- International Conference on Image Processing, IEEE (ICIP 89), "Computer Vision as a Physical Science", Singapore, September 7, 1989.
- American Association of Artificial Intelligence (AAAI 88), "Computer Vision: From Art to Science", St. Paul, MN, August 23, 1988.
- First Conference of Japanese Society of Artificial Intelligence, "AI and Robotics, Present and Future", Tokyo, Japan, June 30-July 2.
- International Conference on Intelligent Autonomous Systems (IAS-I), Amsterdam, The Netherlands, December 8-11, 1986.
- Canadian Artificial Intelligence Conference, Montreal, Canada, May 1986.
- ACM Computer Science Conference, Cincinnati, OH, February 1986.
- National Conference of Association of Computer Science of Germany (GI82).Kaiserslautern, West Germany, October 6, 1982.
- Fourth International Joint Conference on Pattern Recognition, Kyoto, Japan, November 1978.
- Fifth International Joint Conference on Artificial Intelligence (IJCAI77), Boston, MA, August 1977.

Patents

- Japanese Patent No. 4154486: A Method for 3-Dimensional Position Localization, A Processing Program for 3-Dimensional Position Localization, and Media That Records the Program, (Yoshifumi Nishida, Toshio Hori, and Takeo Kanade), Filed November 21, 2003; Issued on July 18, 2008.
- United States Patent No. 7,106,361: System and Method for Manipulating the Point of Interest in a Sequence of Images, (T. Kanade, R. Collins), Filed February 12, 2002; Issued September 12, 2006
- United States Patent No. 7,102,666: System and Method for Stabilizing Rotational Images, (T. Kanade, R. Collins), Filed February 12, 2002; Issued September 05, 2006
- Japanese Patent No. 3804725: A Bill Recognition Device and a Generation Method of Recognition Criteria Data (with Hitachi-Omron Terminal Solutions, Corp.), Filed April 14, 1998; Issued May 19, 2006.
- United States Patent No. 7,027,083: System and Method for Servoing on a Moving Fixation Point within a Dynamic Scene, (T. Kanade, R. Collins, O. Amidi, R. Miller, W. Hua), Filed February 12, 2002 and Issued April 11, 2006
- United States Patent No. 6757582: Methods and Systems to Control a Shaping Tool (G. Brisson, T. Kanade, A.M. Di Gioia, III, MD, and B. Jaramaz) June, 2004.
- United States Patent No. 6,205,411 B1: Computer-Assisted Surgery Planner and Intra-Operative Guidance, (with DiGioia, Simon, Jaramaz, Blackwell, Morgan and O'Toole), Filed November 12, 1998; Issued March 20, 2001.
- United States Patent No.6,084,979: Method for Creating Virtual Reality (with Narayanan, India, and Rander); Filed June 20, 1996; Issued July 4, 2000.

- United States Patent No. 6,002,859: Apparatus and Method for Facilitating the Implantation of Artificial Components in Joints (with DiGioia, Simon, Jaramaz, Blackwell, Morgan and O'Toole), Filed November 12, 1998; Issued December 14, 1999.
- United States Patent No. 5,995,738: Apparatus and Method for Facilitating the Implantation of Artificial Joints (with DiGioia, Simon, Jaramaz, Blackwell, Morgan and O'Toole), Filed November 12, 1998; Issued November 30, 1999.
- United States Patent No. 5880976: Apparatus and Method for Facilitating the Implantation of Artificial Components in Joints (with DiGioia, Simon, Jaramaz, Blackwell, Morgan and O'Toole), Filed February 21, 1997; Issued March 9, 1999.
- European Patent No. 0786114: Method and Apparatus for Creating a Searchable Digital Video Library and a System and Method of Using Such a Library (1 of 7 inventors); Issued August 5, 1998.
- United States Patent No. 5,823,192: Apparatus for Automatically Positioning a Patient for Treatment/Diagnosis (with Kalend, Greenberger, Shimoga, Athanassiou); Issued October 20, 1998.
- United States Patent No. 5,784,431: Apparatus for Matching X-Ray Images with Reference Images (with Kalend, Greenberger, Shimoga, Athanassiou); Issued July 21, 1998.
- United States Patent No. 5,727,554: Apparatus Responsive to Movement of a Patient During Tretment/Diagnosis (with Kalend, Greenberger, Shimoga, Athanassiou); Issued March 17, 1998.
- United States Patent No. 5,617,490: Camera System with Neural Network Compensator for Measuring 3-D Position (with Masao Kume), Filed January 27, 1994; Issued April 1, 1997.
- Singapore Patent No. 39526: Method and Apparatus for Creating a Searchable Digital Video Library and a System and Method of Using Such a Library (with M. Mauldin, M. Smith, S. Stevens, H. Wactlar, M. Christel, and R. Reddy); International Filed October 12, 1995; International Publication Date April 25, 1996.
- United States Patent No. 5,107,103: Integrated Circuit Having at Least a Sensor and a Processor Thereon with A. Gruss and R. Carley); Filed January 25, 1990; Issued April 21, 1992.
- United States Patent No. 4,912,336: Surface Shape and Reflectance Extraction System (with Shree K. Nayar and Katsushi Ikeuchi); Filed February 21, 1989; Issued March 27 1990.
- United States Patent No. 4,563,954: Four-Wheeled Adjustable Vehicle (With T. Okada); Filed October 11,1983; Issued January 14, 1986.
- United States Patent No. 4,526,106: Three-Wheeled Adjustable Vehicle; Filed October 11, 1983; Issued July 2, 1985.
- United States Patent No. 4,427,880: Non-contact Visual Proximity Sensing Apparatus; Filed June 29, 1981; Issued January 24, 1984.
- United States Patent No. 4,425,818: Robotic Manipulator (with H. Asada); Filed September 30, 1981; Issued January 17, 1984.

Ph.D. Theses Supervised

1. Steven A. Shafer, Computer Science, 1983, Shadow Geometry and Occluding Contours of Generalized Cylinders
2. Bruce D. Lucas, Computer Science, 1984, Generalized Image Matching by the Method of Differences
3. Michael Fuhrman, Physics, 1985, Non-Contact Optical Proximity Sensor for measuring Surface Shape
4. Pradeep K. Khosla, Electrical and Computer Engineering, 1986, Real-Time Control and Identification of Direct-Drive Manipulators
5. Leonard G. C. Hamey, Computer Science, 1988, Computer Perception of Repetitive Textures
6. Gudrun J. Klinker, Computer Science (co-advised with Professor Steven Shafer), 1988, A Physical Approach to Color Image Understanding
7. Victor N. Milenkovic, Computer Science, 1988, Verifiable Implementations of Finite Precision Arithmetic
8. Richard Szeliski, Computer Science (co-advised with Professor Andrew Witkin), 1988, Bayesian Modeling of Uncertainty in Low-Level Vision
9. Larry H. Matthies, Computer Science, 1989, Dynamic Stereo Vision
10. David R. Smith, Computer Science, 1989, Autonomous Scene Description with Range Imagery
11. Ellen G. L. Walker, Computer Science, 1989, Frame-based Geometric Reasoning for Construction and Maintenance of 3DWorld
12. Richard S. Wallace, Computer Science, 1989, Finding Natural Clusters through Entropy Minimization
13. In-So Kweon, Robotics Institute, 1990, Modeling Rugged Terrain by Mobile Robots with Multiple Sensors
14. Jill D. Crisman, Electrical and Computer Engineering, 1990, Color Vision for the Detection of Unstructured Roads and Intersections
15. Shree K. Nayar, Electrical and Computer Engineering (co-advised with Professor Katsushi Ikeuchi), 1991, Shape Recovery Using Physical Models of Reflection and Interreflection
16. Carlo Tomasi, Computer Science, 1991, Shape and Motion Recovery from an Image Stream: The Factorization Method
17. Andrew Gruss, Electrical and Computer Engineering, 1992, A VLSI Smart Sensor for Fast Range Imaging
18. James Rehg, Electrical and Computer Engineering, 1995, Visual Analysis of High DOF Articulated Objects with Application to Hand Tracking
19. Conrad Poelman, Computer Science, 1995, Factorization methods for shape and motion recovery.
20. Joao Costeira, University of Lisbon (special supervisor, work performed wholly at CMU with my supervision), 1995, A Multi-body Factorization Method for Motion Analysis
21. Omead Amidi, Electrical and Computer Engineering, 1996, An Autonomous Vision Guided Helicopter
22. Vladimir Brajovic, Robotics Institute, 1996, Computational Sensors for Global Operations in Vision
23. David Simon, Robotics Institute, 1996 Fast and Accurate Shape-Based Registration
24. Richard Madison, Electrical and Computer Engineering, 1997 RVMDES: A tool for Efficient Design of Complete, High Speed, Image Processing Machines.

25. Michael Smith, Electrical and Computer Engineering, 1998, Integration of Image and Language Understanding for Video Characterization and Variable Rate Skimming
26. Peter Rander, Electrical and Computer Engineering, 1998, A Multi-Camera Method for 3D Digitization of Dynamic, Real-World Events
27. Henry A. Rowley, Computer Science Department, May, 1999, Neural Net-Work Based Face Detection.
28. Mei Chen, Robotics Institute, October, 1999, 3D Deformable Registration Using a Statistical Atlas with Applications in Medicine
29. Teck Khim Ng, Electrical and Computer Engineering, 1999, PALM - Portable Sensor-Augmented Vision System for Large-Scene Modeling
30. Joyoni Dey, Electrical and Computer Engineering, 1999, Modeling and Analysis of Ultrasound Propagation in Layered Medium
31. Schneiderman, Henry W., Robotics Institute, March, 2000, A Statistical Approach to 3D Object Detection Applied to Faces and Cars
32. Mettler, Bernard F., Mechanical Engineering, November, 2000, Modeling Small-Scale Unmanned Rotorcraft for Advanced Flight Control Design
33. Han, Mei, Robotics Institute, February, 2001, Linear and Bilinear Subspace Methods for Structure from Motion
34. Kagalwala, Farhana, Electrical and Computer Engineering, April, 2001, Reconstructing Specimens Using DIC Images: From Observations to Measurements
35. Morris, Daniel D., Robotics Institute, March, 2001,Gauge Freedoms and Uncertainty Modeling for 3D Computer Vision
36. LaRose, David, Electrical and Computer Engineering, April, 2001, Iterative X-ray/CT Registration Using Accelerated Volume Rendering
37. Amin, Devin Vikram, Biomedical Engineering, May, 2001, Ultrasound Registration for Surgical Navigation
38. Vedula, Sundar, Robotics Institute, September, 2001, Image Based Spatio-Temporal Modeling and View Interpolation of Dynamic Events
39. Mor, Andrew, Robotics Institute, October, 2001, Progressive Cutting with Minimal New Element Creation of Soft Tissue Models for Interactive Surgical Simulation
40. Sim, Terence, Electrical and Computer Engineering, June, 2002, Statistically-Optimal Image-Based Rendering and Its Application to Face Recognition
41. Zitnick, C. Lawrence, Robotics Institute, April 2003, Computing Conditional Probabilities in Large Domains by Maximizing Renyi's Quadratic Entropy
42. Cheung, Kong Man, Robotics Institute, June, 2003, Visual Hull Construction, Alignment and Refinement for Human Kinematic Modeling, Motion Tracking and Rendering
43. Ke, Qifa, Computer Science Department, August, 2003, A Robust Subspace Approach to Extracting Layers from Image Sequences
44. Tsin, Yanghai, Robotics Institute, September, 2003, Kernel Correlation as an Affinity Measure in Point-Sampled Vision Problems
45. Mishra, Pragyana, Robotics Institute, March, 2005, Image and Depth Coherent Surface Description
46. Xiao, Jing, Robotics Institute, May, 2005, Reconstruction, Registration, and Modeling of Deformable Object Shapes
47. Dedeoglu, Goksel, Robotics Institute, April, 2007, Exploiting Space-Time Statistics of Videos for Face "Hallucination"

48. Hua Zhong, Computer Science Department, October 2007, Image Guided Navigation for Minimally Invasive Surgery
49. Michel, Phillip, Robotics Institute, July 2008, Integrating Perception and Planning for Humanoid Autonomy
50. Li, Yan, Electrical and Computer Engineering, December 2008, Models for Object Detection, Recognition and Shape Alignment
51. Li, Kang, Electrical and Computer Engineering, March 2009, Large-Scale Stem Cell Population Tracking in Phase Contrast and DIC Microscopy Image Sequences
52. Gu, Lie, Computer Science Department, June 2009, Robust Object Alignment
53. Datta, Ankur, Robotics Institute, April 2010, Closed-Form Analysis of Human Motion in Monocular Videos
54. Diankov, Rosen, Robotics Institute, August 2010, Automated Construction of Robotic Manipulation Programs
55. Barnum, Peter, Robotics Institute, August 2011, Light and Water Drops
56. Hwangbo, Myung, Robotics Institute, May 2012, Vision-Based Navigation for a Small Fixed-Wing Airplane in Urban Environment
57. Kang, Hongwen, Robotics Institute, December 2012, Object Instance Discovery from Scenes of Daily Living
58. Huh, Suengil, Robotics Institute, May 2013, Toward an Automated System for the Analysis of Cell Behavior: Cellular Event Detection and Cell Tracking in Time-lapse Live Cell Microscopy
59. Pan, Jiyan, Robotics Institute, May 2014, Coherent Scene Understanding with 3D Geometric Reasoning