Zhengyou ZHANG, **Ph.D., D.Sc. (*Habilitation*)**
IEEE Fellow, ACM Fellow

Research Manager/Principal Researcher, Microsoft Research

listed in *Who's Who in the World*
Who's Who in America
Who's Who in Science and Engineering

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Titles and Positions

January 2003 –	Research Manager, Microsoft Corporation, USA
August 1999 –	Principal Researcher, Microsoft Corporation, USA
Mar. 1998 – July 1999	Senior Researcher, Microsoft Corporation, USA
Oct. 1991 – Mar. 1998	Senior Research Scientist, INRIA, France
	(French National Research Institute in Computer Science and Control)
Dec. 1996 – Dec. 1997	Invited Researcher, ATR, Japan
	(Advanced Telecommunications Research Institute International)
July 1990 – Sep. 1991	Research Scientist, INRIA, France
Sep. 1987 – June 1990	Assistant Researcher, INRIA, France
Sep. 1986 – July 1987	Assistant Researcher, CRIN, France
	(Research Center in Computer Science of Nancy)

Affiliate Positions

September 2006 –	Affiliate Professor, University of Washington, Seattle, USA. Since July 3, 2008, also appointed to the University of Washington Graduate Faculty.
February 1994 –	Guest Research Professor, Chinese Academy of Sciences, China
September 2000 –	Guest Professor, Zhejiang University, Zhejiang, China
March 2001 –	Adjunct Professor, University of Southern California (USC), Los Angeles, USA

Degrees

- *Habilitation à diriger des recherches* (Ph.D. Supervisor, Doctor of Science), University of Paris XI, France, November 1994.
- Ph.D. in Computer Science, University of Paris XI - Orsay, France, October 1990.
- M.S. in Computer Science, University of Nancy, France, July 1987.
- Diploma in French, Institute of Foreign Languages of Shanghai, China, May 1986.
- B.S. in Electronic Engineering, Zhejiang University, China, June 1985.

Awards

- IEEE Fellow, 2005, for contributions to robust computer vision techniques.
- ACM Fellow, 2013, for contributions to computer vision and multimedia.
- IEEE Helmholtz Test of Time Award, 2013, for the paper on camera calibration published at ICCV 1999, with over 10,000 citations.
- ACM Recognition of Service Award, 2015, for serving as General Chair of ICMI 2015.
- *IEEE MultiMedia* Best Department Article Award 2015, for "Microsoft Kinect Sensor and its Effect", 19(2):4–10, 2012.
- *IEEE Transactions on Multimedia* Best Paper Award 2016, for "Robust Part-based Hand Gesture Recognition based on Finger-Earth Mover's Distance", 15(5):1110–1120, 2013.
- A few other service awards.
- A few best paper awards.

Microsoft Product Ship-It Awards

Windows XP Media Center Edition, 2004
Xbox Live Vision, 2006
RoundTable 2007
Kinect 2010
Lync 2010
Avatar Kinect 2011
Lync 2013
Office Lens 2015

Research activities

Computer Vision, Speech, Multisensor Fusion, Human-Computer Interface, Multimedia, Telepresence, Communication and Collaboration, Image-based Modeling, Dynamic Scene Analysis, Camera Calibration, Stereo Vision, Motion Analysis, Stereo and Motion Cooperation, Uncalibrated Stereo, Object Recognition, Vision and Graphics, Visual Learning, Mobile Robotics, Autonomous Mental Development.

International Activities

◇ **Editorial Board:**

- Founding Editor-in-Chief of the *IEEE Transactions on Autonomous Mental Development* (IEEE T-AMD), established in 2009. Editor-in-Chief from 2009 to 2014.
- Associate Editor of the *IEEE Transactions on Multimedia* (IEEE T-MM) from 2004 to 2009.
- Associate Editor of the *IEEE Transactions on Pattern Analysis and Machine Intelligence* (IEEE T-PAMI) from 2000 to 2005.

- Associate Editor of the *IEEE Transactions on Circuits and Systems for Video Technology* (IEEE T-CSVT) from 2015 to 2016.
- Associate Editor of the *International Journal of Computer Vision* (IJCV) from 2004 to 2014.
- Member of Honorary Board of the *International Journal of Computer Vision* (IJCV) since 2015.
- Associate Editor of the *International Journal of Pattern Recognition and Artificial Intelligence* (IJPRAI) from 1997 to 2009.
- Associate Editor of the *Machine Vision and Applications* (MVA) from 2004 to 2014.
- Steering Committee member of the *Machine Vision and Applications* (MVA) since 2015.
- Steering Committee member of the *ACM International Conference on Multimodal Interaction* (ICMI) since 2016.
- Area Editor of the *Journal of Computer Science and Technology* (JCST) since 2006.
- Area Editor of the *Encyclopedia of Computer Vision*, Springer, 2013.
- Associate Editor of the *Pattern Analysis and Applications* (PAA) from 2004 to 2006.
- Action Editor of *Videre: A Journal of Computer Vision Research* (MIT Press) from 1998 to 2000.

◇ **Professional Society Committee Members:**

- Vice-Chair of *IEEE Seattle Section*, IEEE, 2015.
- Member of *IEEE Fellow Committee*, IEEE Computer Society, 2005, 2006, 2007, 2010, 2011, 2016.
- Member of *IEEE Computational Intelligence Society Award Committee*, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016.
- Member of *IEEE Multimedia Signal Processing Technical Committee*, Signal Processing Society, 2006-2009.
- Member of *IEEE Autonomous Mental Development Technical Committee*, Computational Intelligence Society, 2004-.
- Chair of *IEEE Autonomous Mental Development Technical Committee*, Computational Intelligence Society, 2006-2009.
- Member of the International Advisory Committee of the *International Conference on Control, Automation, Robotics & Vision* (ICARCV), since 2013.
- Steering Committee Member of the *ACM International Conference on Multimodal Interaction* (ICMI), 2016-.

◇ **Conference Chairs:**

- Area Chair and Demo Chair of *International Conference on Computer Vision* (ICCV'2003), October 2003. Nice, France.
- Program Co-Chair of *Asian Conference on Computer Vision* (ACCV2004), January 2004, Jeju Island, Korea.
- Demo Chair of *International Conference on Computer Vision* (ICCV'2005), October 2005. Beijing, China.
- Area Chair of *Asian Conference on Computer Vision* (ACCV'2006), January 2006. Hyderabad, India.
- Technical Co-Chair of *International Workshop on Multimedia Signal Processing* (MMSP), October 2006, Victoria, BC, Canada.
- Program Co-Chair of *International Workshop on Motion and Video Computing*, November 2006, Austin, TX, USA.
- Chair, Best Student Paper Award Committee, *IEEE International Conference on Multimedia & Expo*, July 2-5, 2007, Beijing China.
- Member, Best Paper Award Committee, *IEEE Conf. Computer Vision and Pattern Recognition* (CVPR 2008), Anchorage, Alaska, June 24-26, 2008.

- Chair, Special Session, *International Conference on Development and Learning* (ICDL 2008), Monterey, California, August 9th-12th, 2008.
- Chair, Brave New Topics Track Chair, *ACM International Conference on Multimedia* (ACM Multimedia), October 27 C November 1, 2008, Vancouver, BC, Canada.
- Program Co-Chair of *International Conference on Development and Learning* (ICDL 2009), Shanghai, China, June 4-7, 2009.
- Member of the Pre- and Interim Steering Committee, in 2009, in charge of revamping the *International Conference of Multimedia and Expo* (ICME), the flagship multimedia conference sponsored by four IEEE societies.
- General Co-Chair of the *International Workshop on Mobile Vision*, San Francisco, USA, June 16, 2010.
- Program Co-Chair of the *International Conference on Multimedia and Expo* (ICME), Singapore, July 2010.
- Program Co-Chair of the *ACM International Conference on Multimedia* (ACM MM), Florence, Italy, October 2010.
- Co-Chair of the *ACM international Workshop on Connected Multimedia*, in conjunction with *ACM Multimedia*, Florence, Italy, October 2010.
- Program Co-Chair of the *ACM International Conference on Multimodal Interfaces* (ICMI), Beijing, China, November 2010.
- General Co-Chair of the *International Workshop on Human Activity Understanding from 3D Data* (HAU3D), Colorado Springs, June 20-25, 2011.
- Area Chair of the *2011 IEEE International Conference on Image Processing* (ICIP 2011), Brussels, Belgium, September 11-14, 2011.
- General Co-Chair of the *International Workshop on Multimedia Signal Processing* (MMSP 2011), Hangzhou, China, October 2011.
- General Co-Chair of the *Joint ACM Workshop on Modeling and Representing Events in Multimedia* (JMRE), in conjunction with *ACM Multimedia*, November 30, 2011.
- General Co-Chair of the *International Workshop on Mobile Vision*, Barcelona, Spain, November 7, 2011.
- General Co-Chair of the *2nd International Workshop on Human Activity Understanding from 3D Data* (HAU3D), Rhodes Island, USA, June 21, 2012.
- Plenary Co-Chair of the *International Conference on Multimedia and Expo* (ICME), Melbourne, Australia, July 9-13, 2012.
- Co-organizer of Special Session on Kinect Beyond Gaming, *European Signal Processing Conference* (EUSIPCO), Bucharest, Romania, August 28-31, 2012.
- Program Co-Chair (Technical Briefs Track) of the *SIGGRAPH Asia*, Singapore, December 2012.
- General Co-Chair of the *International Workshop on Mobile Vision*, Portland, Oregon, June 23, 2013.
- General Co-Chair of the *3rd International Workshop on Human Activity Understanding from 3D Data* (HAU3D), Portland, Oregon, June 24, 2013.
- General Co-Chair of the *IEEE Workshop on Multimodal and Alternative Perception for Visually Impaired People* (MAP4VIP), San Jose, California, USA, July 15-19, 2013.
- Area Chair of *IEEE International Conference on Development and Learning and on Epigenetic Robotics* (IEEE ICDL-EpiRob), Osaka, Japan, Aug. 18–22, 2013.
- General Co-Chair of the *ACM International Conference on Multimodal Interaction* (ICMI), Seattle, WA, USA, Nov. 9-13, 2015.
- General Co-Chair of the *IEEE Conference on Computer Vision and Pattern Recognition* (CVPR), Puerto Rico, USA, July 2017.

◇ **Conference Program Committee Members:**

- Program Committee Member of *International Symposium of Young Investigators on In-*

formation, Computer and Control, February 1994, Beijing, China.

- Program Committee Member of *IEEE International Conference on Computer Vision and Pattern Recognition* (CVPR'96), 1996. San Francisco, USA.
- Program Committee Member of *Third International Conference on Automatic Face and Gesture Recognition* (FG'98), April 1998, Nara, Japan.
- Program Committee Member of *Fourth IEEE Workshop on Applications of Computer Vision* (WACV'98), October 19-21, 1998, Princeton, New Jersey, USA.
- Program Committee Member of *IEEE International Conference on Computer Vision and Pattern Recognition* (CVPR'99), 1999. Colorado, USA.
- Program Committee Member of *IEEE Workshop on Visual Algorithms*, 1999, Corfu, Greece.
- Program Committee Member of *Asian Conference on Computer Vision* (ACCV2000), 2000, Taiwan.
- Program Committee Member of *IEEE International Conference on Computer Vision and Pattern Recognition* (CVPR'2000), 2000. South Carolina, USA.
- Program Committee Member of *International Conference on Computer Vision* (ICCV'2001), 2001. Vancouver, Canada.
- Program Committee Member of *Asian Conference on Computer Vision* (ACCV2002), 2002, Melbourne, Australia.
- Program Committee Member of *Fifth International Conference on Automatic Face and Gesture Recognition* (FG'02), May 2002, Washington, D.C.
- Program Committee Member of *IEEE Workshop on Motion and Video Computing*, Dec. 2002, Orlando, Florida, USA.
- Program Committee Member of *IEEE International Conference on Computer Vision and Pattern Recognition* (CVPR'03), 2003. Madison, Wisconsin, USA.
- Program Committee Member of *IEEE Workshop on Statistical Analysis in Computer Vision*, June 22, 2003, Madison, Wisconsin, USA.
- Program Committee Member of *IEEE International Workshop on Analysis and Modeling of Faces and Gestures*, October 2003, Nice, France.
- Program Committee Member of *ECCV Workshop on Applications of Computer Visions*, Prague, Czech Republic, May 16, 2004.
- Program Committee Member of *the 2nd Workshop on Statistical Methods in Video Processing*, Prague, Czech Republic, May 16, 2004.
- Organizer and Chair of the ICASSP'04 Special Session on "Multi-Sensory Technology for Context-Aware Computing", May 2004, Montreal, Quebec, Canada.
- Program Committee Member of *the 2nd IEEE Workshop on Image and Video Registration*, July 2004, Washington DC, USA.
- Program Committee Member of *The 7th IASTED International Conference on Computers and Advanced Technology in Education* (CATE), August 16-18, 2004 Kauai, Hawaii, USA
- Program Committee Member of *the 17th International Conference on Pattern Recognition* (ICPR), Cambridge, UK, August 23–26, 2004.
- Program Committee Member of *The 7th IASTED International Conference on Computers and Advanced Technology in Education* (CATE), Kauai, Hawaii, USA, August 16-18, 2004.
- Program Committee Member of *The Sixth International Conference on Multimodal Interfaces* (ICMI'04), October 2004, Pennsylvania State University, PA, USA.
- Program Committee Member of *International Conference on Computer Vision/Computer Graphics Collaboration: Techniques and Applications* (Mirage 2005), March 1–2, 2005, INRIA Rocquencourt, France.
- Program Committee Member of *IEEE International Conference on Computer Vision and Pattern Recognition* (CVPR), June 2005, San Diego, CA, USA.
- Program Committee Member of *The 8th IASTED International Conference on Computers and Advanced Technology in Education* (CATE), August 29-31, 2005 Oranjestad, Aruba

- Program Committee Member of *The 5th International Conference on Development and Learning* (ICDL06), May 31- June 3, 2006, Bloomington, Indiana, USA.
- Program Committee Member of *The 9th European Conference on Computer Vision* (ECCV2006), May 7 - 13, 2006, Graz, Austria.
- Program Committee Member of *The 2nd Workshop on Multimodal User Authentication* (MMUA 2006), May 11–12, 2006, Toulouse, France.
- Program Committee Member of *International Workshop on 25 Years of RANSAC*, June 18, 2006. New York, NY, USA.
- Program Committee Member of *IEEE International Conference on Computer Vision and Pattern Recognition* (CVPR'06), June 17-22, 2006. New York, NY, USA.
- Program Committee Member of *The 18th International Conference on Pattern Recognition* (ICPR2006), August 20-24, 2006, Hong Kong, China.
- Program Committee Member of *The 9th IASTED International Conference on Computers and Advanced Technology in Education* (CATE), October 4-6, 2006, Lima, Peru
- Program Committee Member of *The Eighth International Conference on Multimodal Interfaces* (ICMI06), November 2-4, 2006, Banff, Canada.
- Program Committee Member of *IEEE International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), April 15–20, 2007, Honolulu, Hawaii, USA.
- Program Committee Member of *RIAO Conference on Large-Scale Semantic Access to Content (Text, Image, Video and Sound)*, May 30 - June 1, 2007,Pittsburgh, PA, USA.
- Program Committee Member of *The 6th International Conference on Development and Learning* (ICDL07), July 11-13, 2007, London, UK.
- Program Committee Member of *International Conference on Signal Processing and Multimedia Applications* (SIGMAP), July 28–31, 2007, Barcelona, Spain.
- Program Committee Member of *International Workshop on Multimedia Signal Processing* (MMSP), Oct. 1–3, 2007, Crete, Greece.
- Program Committee Member of *The 10th IASTED International Conference on Computers and Advanced Technology in Education* (CATE), October 8-10, 2007, Beijing, China.
- Program Committee Member of *IEEE International Workshop on Analysis and Modeling of Faces and Gestures* (AMFG), October 20, 2007, Rio de Janeiro, Brazil.
- Program Committee Member of *IEEE International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), March 30 - April 4, 2008, Las Vegas, Nevada, USA.
- Program Committee Member of *International Conference on Signal Processing and Multimedia Applications* (SIGMAP), July 26-29, 2008, Porto, Portugal.
- Program Committee Member of *International Conference on Development and Learning* (ICDL 2008), Monterey, California, August 9th-12th, 2008.
- Program Committee Member of *International Workshop on Projector-Camera Systems* (ProCams 2008), co-locating with SIGGRAPH 2008, Los Angeles, CA, USA, Aug. 10, 2008.
- Program Committee Member of *International Workshop on Multimedia Signal Processing* (MMSP), October 8–10, 2008, Cairns, Queensland, Australia.
- Program Committee Member of *ACM International Conference on Multimedia* (ACM Multimedia), October 27 C November 1, 2008, Vancouver, BC, Canada.
- Program Committee Member of *IEEE International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), April 19–24, 2009, Taipei, Taiwan.
- Program Committee Member of *International Workshop on Projector-Camera Systems* (ProCams 2009), co-locating with CVPR 2009, Miami, FL, USA, June 25, 2009.
- Program Committee Member of *IEEE International Conference on Multimedia and Expo* (ICME 2009), June 28 - July 3, 2009, New York City, New York.
- Program Committee Member of *International Workshop on Multimedia Signal Processing* (MMSP), October 5-7, 2009, Rio de Janeiro, Brazil.
- Program Committee Member of *ACM International Conference on Multimedia* (ACM

MM), October 19-24, 2009, Beijing, China.
- Program Committee Member of *IEEE International Workshop on Hot Topics in 3D* (Hot3D), July 23, 2010, Singapore.
- Program Committee Member of *ACM International Conference on Multimedia Retrieval* (ICMR), April 17-20, Trento, Italy.
- Program Committee Member of *IEEE International Workshop on Hot Topics in 3D* (Hot3D), July 15, 2011, Barcelona, Spain.
- Program Committee Member of *IEEE International Conference on Development and Learning and on Epigenetic Robotics* (IEEE ICDL-EpiRob), August 24-27, 2011, Frankfurt, Germany.
- Program Committee Member of *IEEE International Conference on Computer Vision* (ICCV), Nov. 6-13, 2011, Barcelona, Spain.
- Program Committee Member of *IEEE International Conference on Image Processing* (ICIP), Sept. 30 - Oct. 3, 2012, Orlando, Florida.
- Program Committee Member of *IEEE International Conference on Development and Learning and on Epigenetic Robotics* (IEEE ICDL-EpiRob), November 7-9, 2012, San Diego, California, USA.
- Program Committee Member of *the 26th International Conference on Computer Animation and Social Agents* (CASA 2013), May 16-18, 2013, Istanbul, Turkey.
- Program Committee Member of *IEEE China Summit and International Conference on Signal and Information Processing* (ChinaSIP), Beijing, China, July 6-10, 2013.
- Program Committee Member of the *The 2nd International workshop on Intelligent Mobile Vision* (IMV2013), San Jose, California, USA, July 15-19, 2013.
- Program Committee Member of *International Workshop on Multimedia Signal Processing* (MMSP), Pula (Sardinia), Italy, Sept. 30 - Oct. 2, 2013.
- Program Committee Member of *International Symposium on Mixed and Augmented Reality* (ISMAR), Oct. 1-4, 2013.
- Program Committee Member of *ACM International Conference on Multimedia* (ACM MM), Barcelona, Spain, October 21-25, 2013.
- Program Committee Member of *International Conference on Computer Vision* (ICCV), Sydney, Australia, December 3-6, 2013.

◇ **Miscellaneous activities:**

- Reviewer for the following international journals since 1990: *International Journal of Computer Vision*, *IEEE Trans. Pattern Analysis Machine Intelligence*, *Computer Vision and Image Understanding*, *IEEE Trans. Robotics Automation*, *Image and Vision Computing Journal*, *Artificial Intelligence Journal*, *International Journal of Pattern Recognition and Artificial Intelligence*, *IEEE Trans. Neural Networks*, *International Journal on Document Analysis and Recognition*, *International Journal of Optomechatronics*, *Journal of Zhejiang University (Science)*, etc.
- Reviewer for a number of international conferences including *Int'l Conf. Computer Vision* (ICCV), *European Conf. Computer Vision* (ECCV), *IEEE Conf. Computer Vision Pattern Recognition* (CVPR), *Int'l Conf. Pattern Recognition* (ICPR), *Int'l Conf. Multimodal Interfaces* (ICMI), and many others.
- Overseas Collaborator (1994–1998) in the *Applied Research Project* of Nanyang Technological University, Singapore.

Teaching Activities

- 1991 – 1995, University of Nice – Sophia-Antipolis. D.E.A. (Master) in Robotics and Vision. Contribution to Course "Three-dimensional Computer Vision". Responsible of this course for 1994–1995. 21 hours each year.
- April 1994. COMETT IMPRO (Industrial Image Processing). Contribution to course "Image Interpretation and Robotics". 3 hours.
- April 1995. Greco Informatique, Paris. Industrial course "Computer Vision". 6 hours.
- 1995 – 1996, University of Nice – Sophia-Antipolis. D.E.A. (Master) in Algorithms, Robotics, Automation, Vision, Image and Signal (A.R.A.V.I.S). Co-responsible for Course "Three-dimensional Computer Vision". 15 hours each year.
- 1996 – 1998, University of Nice – Sophia-Antipolis. D.E.A. (Master) in Algorithms, Robotics, Automation, Vision, Image and Signal (A.R.A.V.I.S). Co-responsible for Course "Dynamic Vision". 15 hours each year.
- April 2000, University of South California. Guest lecturer in the Ph.D. program in computer vision.
- February 2001, University of Washington. Guest lecturer in the Computer Science Department.
- August 2001, University of South California. Guest Lecturer in the Computer Science Department.
- April 2003, University of Washington. Guest lecturer in the Computer Science Department.
- May 2003, University of South California. Guest Lecturer in the Computer Science Department.

Supervision of Researchers

- 1989–1993: Nassir NAVAB, Ph.D., *Visual Motion of Lines and Cooperation Between Motion and Stereo*, University of Paris XI. (Co-supervision with O. Faugeras).
- 1989–1993: Michel BUFFA, Ph.D., *Active Stereo Vision for Mobile Robot Navigation*, University of Nice. (Co-supervision with O. Faugeras).
- 1992–1996: Gabriella CSURKA, Ph.D., *Projective Modeling of 3D Objects in Computer Vision*, University of Nice. (Co-supervision with O. Faugeras).
- 1991–1993: Bernard HOTZ, Research Engineer, *Incremental Building of Digital Elevation Maps Using Stereovision*, under grant VAP with CNES.
- 1993: Serge SARACCO & Jean-François PONTHIEUX, Master, *Quantitative studies of 3D Reconstruction with Stereo Vision*, University of Nice.
- 1993–1994: Bernard HOTZ, Research Engineer, *Study of the Impact of Stereovision in the Environment of a Nuclear Center*, under grant TELEMAN II with EEC.
- 1994: José MARTINEZ, Visiting PhD Student, *3D Reconstruction from a Moving Camera*, University of Zaragoza, Spain.
- 1995–1998: Sylvain BOUGNOUX, Ph.D., *Environment Modeling for Visual Localization of an Automatic Vehicle.* University of Nice.
- 1995–1997: Laurence LUCIDO, Ph.D., *Referenced Underwater Navigation by Multiscale Terrain Matching*, University of Nice. (Co-supervision with R. Deriche).
- April–October 1996: Veit Schenk, Master, *Self-maintaining camera calibration over time.* University of Nice.
- 1998: Qifa Ke, Summer Intern, *Virtual Key Frames for Efficient Bundle Adjustment.* Carnegie Mellon University. (Co-supervision with H. Shum)
- 1999–2001: Y. Shan, Post-Doc Researcher, *Modeling Free-Form Objects from Images*, Microsoft Research.
- 1999: K. Nishino, Fall/Winter Intern, *Photometric Modeling of Objects from Images*, University of Tokyo.
- 2000: Ying Wu, Summer Intern, *Vision-based human computer interaction*, University of Illinois.
- 2000: K. Nishino, Summer Intern, *Photometric Modeling of Objects from Images*, University of Tokyo.
- 2001: Ruigang Yang, Summer Intern, *Eye-gaze correction for video tele-conferencing*, University of North Carolina.
- 2002: Guodong Guo, Summer Intern, *Improving virtual video rendering*, University of Wisconsin.
- 2003: Hanning Zhou, Summer Intern, *Interactive Whiteboard System with a Laser Pointer*, University of Illinois at Urbana-Champaign.
- 2003: Yanli Zheng, Summer Intern, *Multi-sensory Speech Enhancement*, University of Illinois at Urbana-Champaign.
- 2004: Amar Subramanya, Summer Intern, *Improving WITTY Multi-sensory Microphone*, University of Clemson.
- 2004: Ya Chang, Summer Intern, *Automatic Head-size Equalization in Video Conferencing with RingCam*, University of California at Santa Barbara. (Co-supervision with Z. Liu)
- 2005: Ming Liu, Summer Intern, *Text-independent and Text-dependent Speaker Verification*, University of Illinois at Urbana-Champaign.
- 2005: Gang Hua, Summer Intern, *Automatic Segmentation of Objects of Interest from an Image*, Northwestern University. (Co-supervision with Z. Liu)
- 2006: Amar Subramanya, Summer Intern, *Text-dependent Speaker Authentication*, University of Washington.

- 2006: Sasa Junuzovic, Summer Intern, *Persistent Collaborative Framework for Interactive Web Applications*, University of North Carolina.
- 2007: Miao Liao, Summer Intern, *Efficient Image Laser-Scan Convertor for Laser Projectors*, University of Kentucky.
- 2007: Sasa Junuzovic, Summer Intern, *Enriching Meeting Viewers With Spatial Cues*, University of North Carolina.
- 2007: Raffay Hamid, Summer Intern, *Improving Speaker Detection for Zooming in RoundTable*, Georgia Institute of Technology. (Co-supervision with C. Zhang)
- 2007: Mingxuan Sun, Summer Intern, *Active Lighting for Video Quality Improvement in Teleconferencing*, Georgia Institute of Technology. (Co-supervision with Z. Liu)

Examination of Ph.D. Theses and Research Proposals

- Examiner of David Hutber's Ph.D. thesis: "Suivi multi-capteurs de cibles multiples en vision par ordinateur, appliqué à un véhicule dans un environnement routier", defended on November 20, 1995 at University of Nice - Sophia Antipolis.
- Referee of Stéphane BETGE-BREZETZ's Ph.D. thesis: "Modélisation incrémentale et localisation par amers pour la navigation d'un robot mobile autonome en environnement naturel", defended on Febraury 16, 1996 at University of Paul Sabatier of Toulouse, France.
- Examiner of José-Marîa Martînez's Ph.D. thesis: "Segments-based 3D Vision", defended on September 13, 1996 at University of Zaragoza, Spain.
- Reviewer of research proposals for Natural Sciences and Engineering Research Council of Canada.
- Referee of Ge CONG's Ph.D. thesis: "Nonlinear scale space theory in computer vision", defended in April 1997 at Chinese Academy of Sciences, Beijing.
- Reviewer of the Best Ph.D. Dissertation in Computer Science in France, 1998.
- Referee of Imad Zoghlami's Ph.D. thesis: "Analysis and processing of color image sequences", defended on February 2000 at University of Nice — Sophia-Antipolis, France.
- Examiner of Moumen Ahmed's Ph.D. Dissertation Proposal: "Camera calibration for active vision systems", defended on May 2000 at University of Louisville, USA.
- Examiner of Moumen Ahmed's Ph.D. Dissertation: "Camera calibration for active vision systems", defended on Nov. 26, 2001 at University of Louisville, USA.
- Examiner of Nan Zhang's PhD Proposal: "A Developing Sensory Mapping for Robots", defended on Dec. 2nd, 2002 at Michigan State University, USA.
- Examiner of Xiaoming Liu's PhD Proposal: "Video-based Face Recognition", defended on June 3rd, 2003 at Carnegie Mellon University, USA.
- Opponent of Henrik Malm's PhD thesis: "Studies in Robotic Vision, Optical Illusions and Nonlinear Diffusion Filtering", defended on September 11, 2003, at Centre for Mathematical Sciences, Lund University, Sweden.
- Examiner of Xiaoming Liu's PhD thesis: "Pose Robust Video-based Face Recognition", defended on October 8, 2004, at Carnegie Mellon University, USA.
- Participation in the evaluation of a promotion of a professor in a university in North America, 2004.
- Participation in the evaluation of a promotion of a professor in a university in Hong Kong, 2005.
- External Evaluation Member, Research Grants Council of Hong Kong, 2005.
- External Evaluation Member, Research Grants Council of Hong Kong, 2006.
- External Evaluation Expert, French National Institute for Research in Computer Science and Control (INRIA), 2006.
- External Evaluation Member, Research Grants Council of Hong Kong, 2007.
- Examiner of Shu Shi's Ph.D. thesis: "A Low-Latency Remote Rendering Systems For Interactive Mobile Graphics", defended on April 16, 2012, University of Illinois at Urbana-Champaign.
- Examiner of Ahmed Maalej's Ph.D. thesis: "3D Facial Expression Recognition Using Shape Analysis and Machine Learning", defended on May 23, 2012, University Lille 1 - Telecom, France.
- Examiner of Qirong Ma's Ph.D. thesis: "Automatic Cable Detection for Millimeter-Wave Radar Video", defended on December 14, 2012, University of Washington.
- Examiner of Feng Zheng's Oral Exam in his PhD program: "Closed-Loop Video-Based Augmented Reality", April 8, 2013, University of North Carolina.
- Examiner of Feng Zheng's Ph.D. thesis: "Spatio-Temporal Registration in Augmented Reality", March 4, 2015, University of North Carolina.

Publications

◇ **Books:**

1. Z. Zhang and O.D. Faugeras, *3D Dynamic Scene Analysis: A Stereo Based Approach*. Springer-Verlag Berlin. 1992.
2. G. Xu and Z. Zhang, *Epipolar Geometry in Stereo, Motion and Object Recognition*. Kluwer Academic Publishers. 1996.
3. S. Ma and Z. Zhang, *Computer Vision: Theory and Applications* (in Chinese). Chinese Academy of Sciences. 1998.
4. C. Zhang and Z. Zhang, *Face Detection and Adaptation*, Morgan and Claypool, 2010.
5. Z. Liu and Z. Zhang, *Face Geometry and Appearance Modeling*, Cambridge University Press, 2011.

◇ **Edited Books:**

1. L. Shao, J. Han, J., P. Kohli, and Z. Zhang, *Computer Vision and Machine Learning with RGB-D Sensors*, Springer, 2014.

◇ **Dissertations:**

1. Z. Zhang, *Décodage acoustico-phonétique par système expert*, M.S. thesis, University of Nancy, France, July 1987.
2. Z. Zhang, *Motion Analysis from a Sequence of Stereo Frames and its Applications*. Ph.D. thesis, University of Paris XI. Orsay, France. 1990.
3. Z. Zhang, *Three-dimensional Perception of a Dynamic Scene from Stereoscopy and Motion. Habilitation à Diriger des Recherches* (Doctor of Science), University of Paris XI. Orsay, France. 1994.

◇ **Editor of Special Issues or Proceedings:**

1. K. Hong and Z. Zhang, editors, *Proceedings of the Sixth Asian Conference on Computer Vision* (ACCV2004), January 2004, Asian Computer Vision Society.
2. Z. Zhang, editor, Special Issue on Face Recognition and Video Analysis, *International Journal of Pattern Recognition and Artificial Intelligence*, Vol. 19, No. 4, June 2005.
3. Z. Zhang, editor, Special Issue on Best of the Sixth Asian Conference on Computer Vision, *International Journal of Computer Vision*, Vol. 66, No. 2, February 2006.
4. J. Weng, B. Scassellati, and Z. Zhang, editors, Special Issue on Autonomous Mental Development: Mind, Body and Beyond, *International Journal of Humanoid Robotics* (IJHR), Vol. 4, No. 2, June 2007.
5. J. Triesch and Z. Zhang, *Proc. International Conference on Development and Learning* (ICDL2009), June 2009, IEEE.
6. Z. (Mark) Zhang, Z. Zhang, R. Jain, Y. Zhuang, *Proceedings of the 1st ACM international workshop on Connected multimedia*, October 2010, ACM.
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1. Z. Zhang and O.D. Faugeras, "Determining Motion from 3D Line Segments: A Comparative Study", *International Journal of Image and Vision Computing*, Vol. 9, No. 1, pages 10–19. February 1991.
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◇ **Publications in French Journals:**

1. Z. Zhang, "Recalage de deux nuages de points 3D", *Traitement du signal*, Vol.10, No.4, pages 263–281, 1993.

◇ **Invited Papers and Keynotes:** (not tracked before 2009)

1. Z. Zhang, "A Framework on Multimodal Telecommunications from a Human Perspective", IEEE MMTC E-Letter, Vol.4, No. 7, pp.7-10, August 2009. (As part of the Distinguished Position Paper Series in the IEEE MMTC E-Letter)
2. Z. Zhang, "Audio-Visual Analysis for Event Understanding" (Keynote), *ACM International Workshop on Ambient Media Computing* (in conjunction with ACM Multimedia 2009), October 23, 2009, Beijing, China.
3. Z. Zhang, "Computer Vision and Auditory Perception" (Keynote), *The 2nd International Conference on Intelligent Robotics and Applications*, December 16-18, 2009, Singapore.
4. Z. Zhang, "Toward Immersive Multimodal Remote Collaboration" (Invited Talk), April 22, 2010, University of North Carolina at Chapel Hill, USA.
5. Z. Zhang, "New 3D Multimedia Applications and Their Challenges" (Invited Talk), May 17-18, 2010, *Industry/academia symposium on 3D multimedia research and technologies*, UIUC, USA.
6. Z. Zhang, "Toward Immersive Multimodal Remote Collaboration" (Invited Talk), May 19, 2010, Northwestern University, USA.
7. Z. Zhang, "From Robots to Avatars to Humans" (Invited Talk), June 8, 2010, *INRIA Symposium Olivier Faugeras OF'60*, INRIA Sophia-Antipolis, France.
8. Z. Zhang, "Audio-Visual Joint Processing for Active Object Detection" (Keynote), *The 11th International Conference on Control, Automation, Robotics and Vision*, December 7-10, 2010, Singapore.
9. Z. Zhang, "3D face modeling and facial expression tracking from video and depth cameras" (Invited Talk), December 7, 2010, Nayang Technology University, Singapore.
10. Z. Zhang, "Audio-Visual Joint Processing for Active Object Detection" (Invited Talk), December 10, 2010, Institute for Infocomm Research, Singapore.
11. Z. Zhang, "Visual and Auditory Perception by Computer" (Keynote), *ACM International Conference on Internet Multimedia Computing and Service*, December 30-31, 2010, Harbin, China.
12. Z. Zhang, "Human Activity Understanding with Depth Sensors" (Invited Talk), February 12, 2011, University of Pennsylvania, USA.
13. Z. Zhang, "Human Body Language Understanding with 3D Sensors", (Panel on 3D Media Analysis and Retrieval), *IEEE International Conference on Multimedia and Expo* (ICME), July 11-15, 2011.
14. Z. Zhang, "Microsoft Kinect Sensor and Natural User Interaction" (Invited Talk), Institute of Automation, Chinese Academy of Sciences, August 3, 2011.
15. Z. Zhang, "Microsoft Kinect Sensor and Natural User Interaction" (Keynote), *ACM International Conference on Internet Multimedia Computing and Service*, August 5-7, 2011, Chengdu, China.
16. Z. Zhang, "Innovating the Multimedia Experience" (Panel), *ACM international conference on Multimedia*, November 2011.
17. Z. Zhang, "Toward Immersive Collaboration", Keynote at *Australian Summit on 3D Multimedia*, Wallongong, Australia, December 20-22, 2011.

18. Z. Zhang, "Human Body Language Understanding with 3D Sensors" (Invited Talk), University of Toronto, Toronto, Canada, March 20, 2012.
19. Z. Zhang, "Toward Immersive Communication and Collaboration" (Distinguished Lecture), Ryerson University, Toronto, Canada, March 21, 2012.
20. Z. Zhang, "Acquisition, Analyse, et Applications des Signaux Visuels 3D" (Keynote), French Conference *CORESA (COmpression et REprésentation des Signaux Audiovisuels)*, Lille, France, May 24-25, 2012.
21. Z. Zhang, "Immersive Telepresence: Transcending Space and Time", (Invited Paper), in *Proceedings of the International Symposium on Ubiquitous Virtual Reality* (ISUVR 2012), IEEE, 2012.
22. Z. Zhang, "Immersive Telepresence: Transcending Space and Time", (Keynote), *International Symposium on Ubiquitous Virtual Reality* (ISUVR 2012), KAIST, Daejoen, South Korea, August 22-25, 2012.
23. Z. Zhang, "Toward Tele-Immersive Communication and Collaboration" (Keynote), *ACM International Conference on Internet Multimedia Computing and Service*, September 9-11, 2012, Wuhan, China.
24. Z. Zhang, "Immersive Telepresence Research at Microsoft" (Keynote), *ACM SIGGRAPH VRCAI*, December 3, 2012, Singapore.
25. Z. Zhang, "Human Body-Language Understanding with 3D Sensors" (Invited Talk), Nanyang Technological University (NTU), December 4, 2012, Singapore.
26. Z. Zhang, "Human Body-Language Understanding by Computer" (Invited Talk), Johns Hopkins University, April 3, 2013.
27. Z. Zhang, "Human Body-Language Understanding by Computer" (Rosenfeld Distinguished Lecture), University of Maryland, April 4, 2013.
28. Z. Zhang, "Human Body-Language Understanding by Computer" (Invited Talk), Tianjin University, China, May 6, 2013.
29. Z. Zhang, "Human Body-Language Understanding by Computer" (Invited Talk), Beijing University, China, May 8, 2013.
30. Z. Zhang, "Tensor-based Human Body Modeling and Progress on Immersive Telepresence" (Invited Talk), Nanyang Technological University (NTU), November 11, 2013, Singapore.
31. Z. Zhang, "Transcending Space through Immersive Telepresence" (Distinguished Visitor Lecture), University of Technology, Sydney, Dec. 1-8, 2013.
32. Z. Zhang, "Tensor-based Human Body Modeling and Topics on Activity Understanding" (Distinguished Visitor Lecture), University of Technology, Sydney, Dec. 1-8, 2013.
33. Z. Zhang, "3D Computer Vision and Immersive Telepresence" (Invited Talk), *International Symposium on Computer Vision and Application*, Beijing, China, May 12-14, 2014.
34. Z. Zhang, "3D Computer Vision and Multimodal Interaction for Large Touch Displays" (Invited Talk), University of Pennsylvania, May 19, 2014.
35. Z. Zhang, "Multimedia Technologies for Multimodal Interaction and Immersive Telecommunications" (Keynote), *International Conference on Multimedia and Expo* (ICME), Chengdu, China, July 14-18, 2014.
36. Z. Zhang, "What's Next? The Future of Multimedia and Telepresence" (After-dinner Talk), IEEE Seattle Chapter 110th Anniversary Gala, October 19,2014.
37. Z. Zhang, "Transcending Space through Immersive Telepresence" (Invited Talk), Shandong University, October 29, 2014.
38. Z. Zhang, "3D Computer Vision and Multimodal Interaction for Large Touch Displays" (Keynote), *21st International Conference on MultiMedia Modeling* (MMM), Sydney, Australia, January 5-7, 2015.
39. Z. Zhang, "Multimodal Immersive Interaction and Collaboration for Large Touch Displays" (Invited Talk), University of North Carolina, March 4, 2015.
40. Z. Zhang, "Vision-enhanced Immersive Interaction and Collaboration with Large Touch Displays" (Invited Talk), BAY AREA MULTIMEDIA FORUM (BAMMF), PARC (George

E. Pake Auditorium), Palo Alto, CA, August 21, 2015.

41. Z. Zhang, "Vision-enhanced Immersive Interaction and Remote Collaboration with Large Touch Displays" (Keynote), *ACM Multimedia Conference*, Brisbane, Queensland, Australia, October 26–30, 2015.
42. Z. Zhang, "Immersive Telepresence: Communication and Collaboration Transcending Space" (Keynote), *Chinese Conference on Computer Aided Design and Computer Graphics* (China CAD&CG), Hangzhou, China, November 4–6, 2016.

◇ **Publications in International Conferences:**

1. N. Ayache, O. Faugeras, F. Lustman, and Z. Zhang, "Visual Navigation of a Mobile Robot: Recent Steps", In *Proc. the International Symposium and Exposition on Robots*, pages 725–740, Sydney, Australia, 6–10 November 1988.
2. M. Buffa, O.D. Faugeras, and Z. Zhang, "Obstacle avoidance and trajectory planning for an indoors mobile robot using stereo vision and Delaunay triangulation", In *Proceedings of Roundtable Discussion on Vision-Based Vehicle Guidance '90*, pages 12-1–12-8, IEEE, July 1990. Science University of Tokyo, Japan.
3. O.D. Faugeras, N. Ayache, and Z. Zhang, "A preliminary investigation of the problem of determining ego- and object motions from Stereo", In *Proc. the 9th International Conference on Pattern Recognition*, pages 242–246, Roma, Italy, 1988.
4. Z. Zhang, O.D. Faugeras, and N. Ayache, "Analysis of a Sequence of Stereo Scenes Containing Multiple Moving Objects Using Rigidity Constraints", In *Proc. the Second International Conference on Computer Vision*, pages 177–186, Florida, USA. December, 1988.
5. Z. Zhang and O.D. Faugeras, "Calibration of Mobile Robot with Application to Visual Navigation", In *Proc. IEEE Workshop on Visual Motion*, pages 306–313, Irvine, California, USA. 20–22 Mars, 1989.
6. T.C. Henderson, R. Deriche, O. Faugeras, R. Vaillant, and Z.Zhang, "Computational Aspects of Multisensor Integration", In *American Control Conference*, Pittsburgh, Pensylvania. June 1989.
7. Z. Zhang and O.D. Faugeras, "Building a 3D World Model with a Mobile Robot: 3D Line Segment Representation and Integration", In *Proc. the 10th International Conference on Pattern Recognition*, pages 38–42, Atlantic City, New Jersey, USA. June 1990.
8. Z. Zhang and O.D. Faugeras, "Tracking and Motion Estimation in a Sequence of Stereo Frames", In *Proc. the 9th European Conference on Artificial Intelligence*, pages 747–752, Stockholm, Sweden. August 1990.
9. Z. Zhang and O.D. Faugeras, "Determining Motion from 3D Line Segments: A Comparative Study", In *Proc. British Machine Vision Conference 1990*, pages 85–90, University of Oxford, UK. 24–27 September, 1990.
10. Z. Zhang and O.D. Faugeras, "Tracking and Grouping 3D Line Segments", In *Proc. 3rd International Conference on Computer Vision*, pages 577–580, Osaka, Japan. December 1990.
11. Z. Zhang and O.D. Faugeras, "Tracking 3D Line Segments: New Developments", In *Proc. 5th International Conference on Advanced Robotics*, pages 1365–1370, Pisa, Italy. 20–22 June 1991.
12. N. Navab, Z. Zhang and O.D. Faugeras, "Tracking, Motion and Stereo: A robust and dynamic cooperation", In *Proc. 7th Scandinavian Conference on Image Analysis*, pages 98–105, Aalborg University, Denmark. August 1991.
13. Z. Zhang and O.D. Faugeras, "Motion Analysis of Two Stereo Views and its Applications", In *Proc. International Symposium "Close-Range Photogrammetry Meets Machine Vision"*, pages 538–645, Zurich, Switzerland. 3–7 September, 1990.
14. Z. Zhang and O.D. Faugeras, "Motion and Structure from Motion from a Long Monocular Sequence", In *Proc. 6th International Conference on Image Analysis and Processing*, pages 264–271, Como, Italy. 4–6 September 1991.

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16. Z. Zhang and O.D. Faugeras, "Finding Clusters and Planes from 3D Line Segments with Application to 3D Motion Determination", In *Proc. Second European Conf. on Comput. Vision*, pages 227–236, Santa Margherita Ligure, Italy. May 1992.
17. N. Navab and Z. Zhang, "From multiple objects motion analysis to behavior-based object recognition", In *Proc. the 10th European Conference on Artificial Intelligence*, pages 790–794, Vienna, Austria. August 1992.
18. N. Navab and Z. Zhang, "Fusion of visual data through dynamic stereo-motion cooperation", In *Proc. XVII Congress of the International Society for Photogrammetry and Remote Sensing ISPRS*, Washington D.C., USA. August 1992.
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Auxiliary Information in Training?", in *AProc. sian Conference on Computer Vision* (ACCV 2014), pages 65–80, Singapore, Nov. 1-5, 2014.
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179. C.-Y. Lee, S. Xie, P. Gallagher, Z. Zhang, and Z. Tu. "Deeply-supervised nets." in *Proc. the 18th International Conference on Artificial Intelligence and Statistics* (AISTATS 2015), San Diego, California, USA, May 9–12, 2015. (Also oral presentation at the NIPS14 Deep Learning and Representation Workshop, December 12, 2014.)
180. Y. Chen, Z. Liu, P.A. Chou, and Z. Zhang, "VTouch: Vision-Enhanced Interaction for Large Touch Displays", in *Proc. IEEE International Conference on Multimedia and Expo* (ICME 2015), Torino, Italy, June 29 - July 3, 2015.
181. E. Barsoum, C.Zhang, C. Canton Ferrer, and Z. Zhang, "Training Deep Networks for Facial Expression Recognition with Crowd-Sourced Label Distribution", in *Proc. 18th ACM International Conference on Multimodal Interaction* (ICMI), Tokyo, Japan, November 12-16, 2016.

Patents

More than 130 US patents awarded
More than 20 US patents pending
A few Japanese patents awarded for inventions during sabbatical stay at ATR, Kyoto, Japan.

European and Industrial Activities

1986–1987 : Project on design of an expert system for acoustico-phonetic decoding.
1987–1992 : European Project ESPRIT P940/DMA, on motion analysis from a sequence of stereo images.
1989–1992 : European Project ESPRIT P2502/VOILA, on vision-guided autonomous vehicle navigation in an indoor environment.
1989–1992 : European Project ESPRIT-BRA P3001/INSIGHT, on cooperation of stereo and motion.
1992–1995 : European Project ESPRIT-BRA P6448/VIVA, on computation of Euclidean invariants directly from images, and computation of projective invariants.
1991–1993 : French Project RISP (Robot d'Intervention sur Site Planétaire) Action VAP (Autonomous Planetary Vehicle), on registration of successive 3D visual maps and incremental construction of digital elevation maps.
1993–1994 : European Project Eureka IARES, on the development of perception system and on the autonomous generation of trajectories for Planetary Rover.
1993–1994 : European Project TELEMAN II, on the impact of stereovision in the environment of a nuclear center.
1995–1996 : European Space Agency Project CALVIN, on the evaluation of different camera calibration techniques for space applications.
1994–1997 : European Project ESPRIT-LTR P8878/REALISE, on extraction, from a number of images, of the information which is necessary for simulation in Virtual Reality.
1995–1998: French Research and Development Program Praxitele, on construction of environment models and visual localization of an automatic electric vehicle.
1996–1998: European Project ESPRIT-LTR P21914/CUMULI, on computational study of multiple images.
1998– : Microsoft Corporation, Redmond, USA.

Softwares developed and transfered

gen_ver: for estimating 3D motion from 3D line segments reconstructed by stereo from two different points of view; approach based on *hypothesis generation-and-verification* paradigm; capable of dealing with multiple object motions; transfered to European partners within ESPRIT project P940 in 1988.

fusion: for building a global 3D visual map of an indoor scene from the 3D data produced by a stereovision system from many points of view; transfered to European partners within ESPRIT project P940 in 1990.

tracking: for tracking 3D line segments in a long image sequence; capable of dealing with multiple object motions by tracking independently each line segment and then grouping them into objects based on similarity of the estimated motion; transfered to European partners within ESPRIT project P2502 in 1991.

register: for registering two dense 3D visual maps of a free-form surface; approach based on iteratively matching closest points with an integrated robust statistical method to eliminate false matches; transfered to CNES (French Space Agency), LAAS, ALCATEL, etc. in 1993.

image-matching: for matching two uncalibrated images (with unknown intrinsic and extrinsic parameters) and estimating the epipolar geometry between them; a robust and automatic approach; registered at APP (Agency for the Protection of Programs) in 1994 under number `94-28-012-00`; distributed on the Internet in June 1994; 305 copies have been made between July 13, 1995 and September 3, 1996, from Yale, CMU, MIT AI-lab, MIT Medialab, Microsoft, Alcatel-Alsthom, Cornell, Cemagref, USC, JPL NASA, Tech. U Graz, K U Leuven, U. Tokyo, Siemens, ... among many others.

fcalib: for calibrating a stereovision system in the context of spatial applications; transfered to ESA (*European Space Agency*) and to partners within project Calvin in 1995.

sfm: for estimating in a robust way the 3D motion and structure from two perspective images with known intrinsic parameters; complement to software `image-matching`; registered at APP (Agency for the Protection of Programs) in 1995 under number `IDDN.FR.001.120021.00.R.X.1995`; improved in 1996 and distributed on the Internet in June 1996.

FMatrix: for estimating the epipolar geometry (the fundamental matrix) between two sets of uncalibrated, possibly bad, point matches under perspective projection; developed in order to evaluate different techniques proposed in the literature; distributed on the Internet in July 1996.

AffineF: for estimating the epipolar geometry between two images with affine projection model; distributed on the Internet in January 1997.

EasyCalib: for calibrating a camera by simply viewing a planar pattern from a few arbitrary orientations; distributed on the Internet in June 1999.

The above list does not include technology transfer within the same institution.

Human Languages

Chinese, English, French, Japanese (notion).