

KUN HUANG

B14 Coordinated Sciences Laboratory
Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign
1308 West Main Street
Urbana, IL 61801

Phone (217) 244-6755 (O)
(217) 337-5363 (H)
Fax (217) 244-1653
Email kunhuang@uiuc.edu
<http://decision.csl.uiuc.edu/~kunh>

Objective

Seeking a research position in areas of machine learning, pattern recognition, computer vision, data mining, robotics and sensor networks.

Education

- Ph.D. Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, 2003 (expected)
--Dissertation: Geometric Principles of Multiple Visual Sensors . (Cumulative GPA 3.89/4.0)
- M.S. Mathematics, University of Illinois at Urbana-Champaign, 2002.
- M.S. Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, 2000
--Thesis: Design of a Traffic Surveillance System: Motion Estimation and Recognition Algorithms.
- M.S. Molecular and Integrative Physiology, University of Illinois at Urbana-Champaign, 1998.
- B.E. Computer Science, Tsinghua University, Beijing, China, 1996. (Cumulative GPA 3.8/4.0)
- B.S. Biology, Tsinghua University, Beijing, China, 1996.

Research Experience

Research Assistant in Decision and Control Group, Department of Electrical and Computer Engineering, UIUC, 1999 - Present

- ❖ Developing a novel mixture model data fitting and clustering algorithm.
- ❖ Developing algorithms for image compression and video event detection.
- ❖ Developing a system for automatic feature extraction, matching and 3D reconstruction.
- ❖ Leading a vision-based robot navigation project.
- ❖ Designed new symmetry-based feature matching and image alignment algorithms.
- ❖ Developed new theory for 3D reconstruction from multiple images of static and dynamic scenes.
- ❖ Designed a novel linear 3D reconstruction algorithm from multiple images.
- ❖ Built real-time visual feedback component for a vision-based multiple autonomous vehicle (UAV) control system.
- ❖ Developed a novel visual sensor synchronization algorithm.
- ❖ Designed traffic surveillance and recognition system using simulated annealing algorithm.

Research Internship in Mitsubishi Electric Research Laboratory (Cambridge), Summer 2002

- ❖ Developed and tested a new data clustering algorithm.

Research Assistant in Neurophysiology Laboratory, Department of Molecular and Integrative Physiology, UIUC, 1996 - 1998

- ❖ Conducted electrophysiological and histochemical study on molecular basis of learning and feeding behaviors in mollusks.

Research Assistant in Neurobiology Laboratory, Department of Biology, Tsinghua University, Beijing, China, 1995 - 1996

- ❖ Designed a software for analyzing data from electrophysiological experiments.

Honors and Awards

Best Teaching Assistant Elected by Students, School of Life Science, University of Illinois, 1998.

Distinguished Graduate Medal, Tsinghua University, 1996.

Award of Outstanding Student in Science and Technology Areas, City of Beijing, 1995.

Guanghua Scholarship, China, 1994.

Excellent Student Scholarship in Tsinghua University, 1993.

Winner of the First Award in the 1st Chinese Mathematics Olympiad, 1991.

Other Activities

Reviewer for IEEE Transactions on Robotics and Automation, IJCV, ICCV, ECCV, CVPR, CDC, ICRA.

Student member of IEEE.

Open water diver certificate.

Computer Skills

Professional use of Matlab. Six years of C/C++ programming in Windows, Unix, Linux and DOS

Visual C++ programming for vehicle tracking project. Two years of Linux system administration

Other languages and tools: JAVA, HTML, PASCAL, FORTRAN, Mathematica, Intel OpenCV Library, Intel Image Processing Library, Active Matrox Imaging Library.

Advanced Courses

Computer vision, control theory, optimal control, stochastic control, hybrid systems, image processing, statistical learning theory, robotic control, random process, digital communication, digital signal processing, optimization, combinatorial algorithms, real analysis, probability theory, differentiable manifolds, Riemannian geometry, abstract algebra, computational neurobiology, neurophysiology, molecular biology, molecular physiology.

Publications

Work in progress:

- ❖ Robert Fossum, Kun Huang and Yi Ma. Generalized Rank Condition in Multiple View Geometry. Submitted to *Computational and Discrete Geometry*, October 2003.
- ❖ Kun Huang, Rene Vidal and Yi Ma. Minimum Effective Dimension for Mixtures of Subspaces: A Robust GPCA Algorithm and its Applications. Submitted to *IEEE Conference on Computer Vision and Pattern Recognition*, November 2003.
- ❖ Kun Huang, Wei Hong, Allen Y. Yang and Yi Ma. Large Baseline Matching and Reconstruction from Symmetry Cells. Submitted to *IEEE International Conference on Robotics and Automation*, November 2003.
- ❖ Kun Huang, Wei Hong and Yi Ma. Symmetry-Based Photo Editing. Submitted to *Pattern Recognition*, October 2003.

Book chapters and journal papers (refereed):

- ❖ Kun Huang and Yi Ma. A Survey on Geometric Vision. In *Handbook of Robotics*, To be published, CRC Press, 2004.
- ❖ Yi Ma, Kun Huang, Rene Vidal, Jana Kosecka and Shankar Sastry. Rank Conditions of the Multiple View Matrix in Multiple View Geometry. To appear, *International Journal of Computer Vision*, 2003 (42 pages).

Conference papers:

- ❖ Kun Huang, Wei Hong and Yi Ma. Symmetry-Based Photo-editing. In *International Conference on Computer Vision, Workshop on Higher Level Knowledge*, Nice, France, 2003.
- ❖ Allen Y. Yang, Shankar Rao, Kun Huang, Wei Hong and Yi Ma. Geometric Segmentation of Perspective Images Based on Symmetry Groups. In *Proceedings of the International Conference on Computer Vision*, Nice, France, 2003.
- ❖ Matthew Brand and Kun Huang. A Unifying Theorem for Spectral Embedding and Clustering. In *Proceedings of the 9th International Conference on Artificial Intelligence and Statistics*, Key West, Florida, 2003.
- ❖ Kun Huang, Robert Fossum and Yi Ma. Generalized Rank Conditions in Multiple View Geometry with Application to Dynamic Scenes. In *Proceedings of the 6th European Conference on Computer Vision*, Copenhagen, Denmark, May 2002.
- ❖ Yi Ma, Kun Huang and Yang Yang. Classification of Rank Conditions for Multiple Views of Dynamical Scenes. In *6th European Conference on Computer Vision, Workshop on Vision and Modeling of Dynamic Scenes*, Copenhagen, Denmark, May 2002.
- ❖ Yi Ma, Jana Kosecka and Kun Huang. Rank Deficiency Condition of the Multiple View Matrix for Mixed Point and Line Features. In *Proceeding of the 5th Asian Conference on Computer Vision*, Melbourne, Australia, January 2002.
- ❖ Kun Huang and P.R.Kumar. Hierarchical and Integrated Algorithms: Comparison and Applications in Motion Estimation and Recognition. In *Proceedings of the 39th IEEE Conference on Decision and Control*, vol.1, 2000, pp.674-9 vol.1. Piscataway, NJ, USA.
- ❖ Kun Huang, Leniod L. Moroz, Leland Sudlow and Rhanor Gillette. Nitric Oxide and 5-HT May Regulate Feeding Network Arousal State via Intracellular Ca²⁺ and H⁺ in *Pleurobranchae Californica*. *Abstracts of 28th Annual Meeting of Society for Neuroscience*, Los Angeles, USA, October 1998.

Technical reports:

- ❖ Kun Huang, Wei Hong, Allen Y. Yang, Shankar Rao and Yi Ma. Symmetry-Based 3-D Reconstruction from Perspective Images (Part I and II). *Technical Report*, UILU-ENG-03-2204, April,2003.
- ❖ Matthew Brand and Kun Huang. A Unifying Theorem for Spectral Embedding and Clustering. *Technical Report of Mitsubishi Electric Research Laboratory*, TR2002-42, October, 2002.
- ❖ Robert Fossum, Kun Huang and Yi Ma. General Rank Conditions in Multiple View Geometry. *Technical Report*, UILU-ENG-01-2222, October 8,2001.
- ❖ Yi Ma, Kun Huang, Rene Vidal, Jana Kosecka and Shankar Sastry New Rank Conditions of the Multiple View Matrix in Multiple View Geometry. *Technical Report*, UILU-ENG-01-2214 (DC-220), June 18, 2001.
- ❖ Yi Ma, Rene Vidal, Kun Huang and Shankar Sastry. New Rank Deficiency Condition for Multiple View Geometry of Point Features. *Technical Report*, UILU-ENG-01-2208 (DC-200), May 8, 2001.
- ❖ Yi Ma, Kun Huang and Jana Kosecka. New Rank Deficiency Condition for Multiple View Geometry of Line Features. *Technical Report*, UILU-ENG-01-2209 (DC-201), May 8, 2001.