

Curriculum Vitae of Yi Ma

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1 EDUCATION

- **Ph.D.** in Electrical Engineering and Computer Sciences, University of California at Berkeley, 2000.
- **Master of Arts** in Mathematics, University of California at Berkeley, 2000.
- **Master of Science** in Electrical Engineering and Computer Sciences, University of California at Berkeley, 1997.
- **Two Bachelor Degree** in Automatic Control and Applied Mathematics, Tsinghua University, Beijing, China, 1995.

2 PROFESSIONAL APPOINTMENTS

- **Associate Professor** (with tenure) of the Electrical & Computer Engineering Department, University of Illinois at Urbana-Champaign, since August 2006.
- **Affiliate Associate Professor** of the Computer Science Department, University of Illinois at Urbana-Champaign, since August 2009.
- **Senior Researcher and Research Manager** of the Visual Computing Group, Microsoft Research Asia, Beijing, China, since January 2009.
- **Research Associate Professor** of the Coordinated Science Laboratory, and of the Beckman Institute, University of Illinois at Urbana-Champaign, since August 2006.
- **Visiting Professor** at Department of Electrical Engineering and Computer Sciences, University of California at Berkeley, Spring 2007.
- **Visiting Senior Researcher** of the Director at Microsoft Research Asia, Beijing, China, Summer and Fall 2006.
- **Assistant Professor** (tenure track) of the Electrical & Computer Engineering Department, University of Illinois at Urbana-Champaign, August 2000 – August 2006.

3 HONORS AND AWARDS

- **Sang Uk Lee Best Student Paper Award** at Asian Conference on Computer Vision, Xi'an, China, September 2009.
- **Keynote Speaker** at ACCV workshop on Community Based 3D Content and its Applications in Mobile Internet Environment, September 24, 2009.
- **Plenary Speaker** at the 22th IPPR Conference on Computer Vision, Graphics, and Image Processing, Taiwan, August 2009.
- **Keynote Speaker** at International Workshop on Local and Non-Local Approximation (LNLA) in Image Processing, Helsinki, August 2009.

- **Plenary Speaker** at Picture Coding Symposium (PCS), Chicago, May 2009.
- **Fessenden Lecture** at ECE Department, the University of Pittsburgh, February 2007.
- **Senior Member of IEEE**, since 2006.
- **Incomplete List of Teachers Ranked as Excellent** (voted by the students), University of Illinois at Urbana-Champaign, Spring 2001, Fall 2002, and Spring 2006.
- **Young Investigator Award** (two recipients nation-wide in the division of Mathematical, Computer and Information Sciences), Office of Naval Research, 2005.
- **Longuet-Higgins Best Paper Award** (honorable mention) of the European Conference on Computer Vision (one prize winner and one honorable mention out of over 700 papers submitted), 2004.
- **Young Faculty CAREER Award**, National Science Foundation, 2003.
- **David Marr Best Paper Award** of the International Conference on Computer Vision (one of two prize winners out of over 600 papers submitted), 1999.
- **Regents Fellowship**, University of California at Berkeley, 1995–1996.
- **Excellent Student Scholarship – First Prize**, Tsinghua University, P. R. China, 1994.
- **Champion** of the First Mathematical and Computer Modeling Contest, Tsinghua University, P. R. China, 1994.

4 PUBLICATIONS

- **Books Authored:**

1. *Generalized Principal Component Analysis: Modeling & Segmentation of Multivariate Mixed Data*, René Vidal, Yi Ma, and Shankar Sastry, Springer, expected 2009.
2. *An Invitation to 3-D Vision: From Images to Geometric Models*, Yi Ma, Stefano Soatto, Jana Košecá, and Shankar Sastry, Springer Series on Interdisciplinary Applied Mathematics (IAM #26), 526 pages/170 illustrations, Springer, New York, November 2003.

- **Book Edited:**

1. *Dynamical Vision*, edited by Rene Vidal, Anders Heyden, and Yi Ma, Lecture Notes in Computer Science (LNCS #4358), 329 pages, Springer, 2007.

- **Journal Special Issue Edited:**

1. Special issue on *Real-World Face Recognition*, edited with Hua Gang et. al., IEEE Transactions on Pattern Analysis and Machine Intelligence, to appear in 2011.
2. Special issue on *Dimensionality Reduction via Subspace and Manifold Learning*, edited by Yi Ma, Partha Niyogi, Guillermo Sapiro, and René Vidal, IEEE Signal Processing Magazine, to appear in 2010.
3. Special issue on *Applications of Sparse Representation and Compressive Sensing*, edited by Richard Baraniuk, Emmanuel Candes, Michael Elad, and Yi Ma, Proceedings of IEEE, to appear in 2009.

- **Journal Papers:**

1. “The Augmented Lagrange Multiplier Method for Exact Recovery of Corrupted Low-Rank Matrices,” Zhouchen Lin, Minming Chen, Leqin Wu and Yi Ma, UIUC Technical Report UILU-ENG-09-2215, submitted to Mathematical Programming, October 2009.
2. “Image Super-Resolution via Sparse Representation,” Jianchao Yang, John Wright, Thomas Huang, and Yi Ma, submitted to IEEE Transactions on Image Processing, September 2009.
3. “Fast Convex Optimization Algorithms for Exact Recovery of a Corrupted Low-Rank Matrix,” Zhouchen Lin, Arvind Ganesh, John Wright, Leqin Wu, Minming Chen, and Yi Ma, UIUC Technical Report UILU-ENG-09-2214, submitted to SIAM Journal on Optimization, July 2009.

4. "Robust Principal Component Analysis: Exact Recovery of Corrupted Low-Rank Matrices via Convex Optimization," John Wright, Yi Ma, Arvind Ganesh, and Shankar Rao, submitted to the Journal of the ACM, 2009.
5. "Sparse Representation for Computer Vision and Pattern Recognition," John Wright, Yi Ma, Guillermo Sapiro, Shuicheng Yan, and Thomas Huang, to appear in the Proceedings of IEEE, 2009.
6. "On the Role of Sparse and Redundant Representations in Image Processing," Michael Elad, Mario Figueiredo, and Yi Ma, to appear in the Proceedings of IEEE, 2009.
7. "Motion Segmentation in the Presence of Outlying, Incomplete, and Corrupted Trajectories," Shankar Rao, Roberto Tron, Rene Vidal, and Yi Ma, accepted by IEEE Transactions on Pattern Analysis and Machine Intelligence, December 2008.
8. "Dense Error Correction via ℓ^1 Minimization," John Wright and Yi Ma, accepted by IEEE Transactions on Information Theory, August 2008.
9. "Robust Algebraic Segmentation of Mixed Rigid-Body and Planar Motions," Shankar Rao, Allen Yang, Shankar Sastry, and Yi Ma, to appear in the International Journal of Computer Vision, August 2008.
10. "Classification via Minimum Incremental Coding Length (MICL)," John Wright, Yi Ma, Yangyu Tao, Zhouchen Lin, and Heung-Yeung Shum, SIAM Journal on Imaging Science, vol. 2, issue 2, page 367-395, April 2009.
11. "Robust Face Recognition via Sparse Representation," John Wright, Allen Yang, Arvind Ganesh, Shankar Sastry, and Yi Ma, IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), vol. 31, no. 2, February 2009.
12. "Estimation of Subspace Arrangements with Applications in Modeling and Segmenting Mixed Data," Yi Ma, Allen Yang, Harm Derksen, and Robert Fossum, *SIAM Review*, vol. 50, no. 3, August 2008.
13. "Unsupervised Segmentation of Natural Images via Lossy Data Compression," Allen Yang, John Wright, Yi Ma, and Shankar Sastry, Computer Vision and Image Understanding (CVIU), vol. 110, no. 2, May 2008.
14. "Segmentation of Multivariate Mixed Data via Lossy Data Coding and Compression," Yi Ma, Harm Derksen, Wei Hong, and John Wright, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 29, no. 9, pages 1546-1562, September 2007.
15. "Multi-Scale Hybrid Linear Models for Lossy Image Representation," Wei Hong, John Wright, Yi Ma, and Kun Huang, *IEEE Transactions on Image Processing*, vol. 15, no. 12, pages 3655-3671, December 2006.
16. "A Unified Algebraic Approach to 2-D and 3-D Motion Segmentation and Estimation," Yi Ma and Rene Vidal, *Journal Mathematical Imaging and Vision*, vol. 25, pages 403-421, November 2006.
17. "Two-View Multibody Structure from Motion," René Vidal, Yi Ma, Stefano Soatto, and Shankar Sastry, *International Journal of Computer Vision*, special issue on *Dynamical Vision*, vol. 68, no. 1, pages 7-25, June 2006.
18. "Generalized Principal Component Analysis (GPCA)," René Vidal, Yi Ma, and Shankar Sastry, IEEE Transactions on *Pattern Analysis and Machine Intelligence*, vol. 27, no. 12, pages 1945-1959, December 2005.
19. "Symmetry-Based 3-D Reconstruction from Perspective Images," Allen Yang, Kun Huang, Shankar Rao, and Yi Ma, *Computer Vision and Image Understanding*, vol.99, issue 2, pages 210-240, August 2005.
20. "Symmetry Based Photo Editing," Kun Huang, Wei Hong, and Yi Ma, the special issue on image understanding for digital photos of *Pattern Recognition*, vol. 38, no. 6, pages 825-834, 2005.
21. "A Survey of Geometric Vision," Kun Huang and Yi Ma, book chapter of *Robotics and Automation Handbook*, edited by Thomas Kurfess, chapter 22, pages 1-25, CRC press, 2005.
22. "On Symmetry and Multiple View Geometry: Structure, Pose and Calibration from a Single Image," Wei Hong, Yang Yang, and Yi Ma, *International Journal of Computer Vision*, vol. 60, no. 3, pages 241-265, December, 2004.
23. "Rank Conditions on the Multiple View Matrix," Yi Ma, Kun Huang, René Vidal, Jana Košecká, and Shankar S. Sastry, *International Journal of Computer Vision*, vol. 59, no. 2, pages 115-137, September 2004.
24. "A Differential Geometric Approach to Multiple View Geometry in Spaces of Constant Curvature," Yi Ma, *International Journal of Computer Vision*, vol. 58, no. 1, pages 37-53, 2004.
25. "Optimization Criteria and Geometric Algorithms for Motion and Structure Estimation," Yi Ma, Jana Košecká, and Shankar S. Sastry, *International Journal of Computer Vision* vol. 44, no. 3, pages 219-249, 2001.

26. "Optimal Motion from Multiple Views by Normalized Epipolar Constraints," Yi Ma, René Vidal, Shawn Hsu, and Shankar S. Sastry, *Communications in Information and Systems*, vol. 1, no. 1, pages 51-73, 2001.
27. "Euclidean Reconstruction and Reprojection up to Subgroups," Yi Ma, Stefano Soatto, Jana Košecká, and Shankar Sastry, in Proceedings of the 7th IEEE International Conference on Computer Vision (ICCV), Corfu, Greece, September 1999, vol. 2, page 773-780, also in the *International Journal of Computer Vision* special issue of the **David Marr Best Paper Prize** papers, vol. 38, no. 3, pages 217-227, 2000.
28. "Linear Differential Algorithm for Motion Recovery: A Geometric Approach," Yi Ma, Jana Košecká, and Shankar Sastry, the *International Journal of Computer Vision (IJCV)*, vol. 36, no. 1, pages 71-89, 2000.
29. "Landing an Unmanned Aerial Vehicle: Vision Based Motion Estimation and Nonlinear Control," Omid Shakernia, Yi Ma, John Koo, and Shankar Sastry, the *Asian Journal of Control*, vol. 1, no. 3, pages 128-45, 1999.
30. "Vision Guided Navigation for a Nonholonomic Mobile Robot," Yi Ma, Jana Košecká, and Shankar Sastry, the *IEEE Transactions on Robotics and Automation*, vol. 15, no. 3, pages 521-36, 1999.

• **Conference Papers in Computer Vision & Image Processing:**

1. "Fast Convex Optimization Algorithms for Exact Recovery of a Corrupted Low-Rank Matrix," Arvind Ganesh, Zhouchen Lin, John Wright, Leqin Wu, Minming Chen, and Yi Ma, International Workshop on Computational Advances in Multi-Sensor Adaptive Processing, December 2009.
2. "Robust Principal Component Analysis: Exact Recovery of Corrupted Low-Rank Matrices via Convex Optimization," John Wright, Arvind Ganesh, Shankar Rao, and Yi Ma, in Proceedings of the Conference on Neural Information Processing Systems (NIPS), December 2009.
3. "Face Recognition with Contiguous Occlusion using Markov Random Fields," Zihan Zhou, Andrew Wagner, Hossein Mobahi, John Wright, and Yi Ma, in Proceedings of the IEEE International Conference on Computer Vision (ICCV), 2009.
4. "Learning Topology of Curves with Applications to Clustering," Hossein Mobahi, Shankar Rao, and Yi Ma, in Proceedings of AAAI Symposium on Manifold Learning, 2009.
5. "Natural Image Segmentation with Adaptive Texture and Boundary Encoding," Shankar Rao, Hossein Mobahi, Allen Yang, Shankar Sastry, and Yi Ma, the Best Student Paper Award (the Sang Uk Lee Award), in Proceedings of the Asian Conference on Computer Vision, September 2009.
6. "Data-Driven Image Completion by Image Patch Subspaces," Hossein Mobahi, Shankar Rao, and Yi Ma, submitted to PCS 2009.
7. "Distributed Video Coding Using Compressive Sampling," Josep Prades-Nebot, Yi Ma, Thomas Huang, submitted to PCS 2009.
8. "Minimum Sum of Distances Estimator: Robustness and Stability," Yoav Sharon, John Wright, and Yi Ma, submitted to American Conference on Control, 2009.
9. "Separation of A Subspace-Sparse Signal: Algorithms and Conditions," Arvind Ganesh, Zihan Zhou, and Yi Ma, in Proceedings of ICASSP 2009.
10. "Dense Error Correction via L1-Minimization," John Wright and Yi Ma, in Proceedings of ICASSP 2009.
11. "Nearest-Subspace Patch Matching for Face Recognition Under Varying Pose and Illumination," Zihan Zhou, Arvind Ganesh, John Wright, Shen-Fu Tsai, and Yi Ma, IEEE Conference on Face and Gesture Recognition, 2008.
12. "Face Hallucination via Sparse Coding," Jianchao Yang, Hao Tang, Yi Ma, and Thomas Huang, International Conference on Image Processing (ICIP), 2008.
13. "Motion Segmentation via Robust Subspace Separation in the Presence of Outlying, Incomplete, or Corrupted Trajectories," Shankar Rao, Roberto Tron, Rene Vidal, and Yi Ma, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), June 2008.
14. "Image Super-Resolution as Sparse Representation of Raw Image Patches," Jianchao Yang, John Wright, Thomas Huang, and Yi Ma, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), June 2008.
15. "Classification via Minimum Incremental Coding Length (MICL)," John Wright, Yangyu Tao, Zhouchen Lin, Yi Ma, and Heung-Yeung Shum, Conference on Neural Information Processing Systems (NIPS), December 2007.

16. "Segmentation of Multivariate Mixed Data via Lossy Coding and Compression," John Wright, Wei Hong, Yi Ma, and Harm Derksen, SPIE conference on Visual Communications and Image Processing (VCIP), January 2007.
17. "The Algebra and Statistics of Generalized Principal Component Analysis," Shankar Rao, Harm Derksen, Robert Fossum, Yi Ma, Andrew Wagner, and Allen Yang, SPIE conference on Visual Communications and Image Processing (VCIP), January 2007.
18. "Robust Statistical Estimation and Segmentation of Multiple Subspaces," Allen Yang, Shankar Rao, and Yi Ma, Workshop on 25 years of RANSAC, IEEE Conference on Computer Vision and Pattern Recognition, New York, June 2006.
19. "Homographies and Matching of Ellipses with Applications to Forensic Bloodspatter Reconstruction," John Wright, Andrew Wagner, Shankar Rao, and Yi Ma, IEEE Conference on Computer Vision and Pattern Recognition, New York, June 2006.
20. "Database-Guided Simultaneous Multi-Slice 3-D Segmentation for Volumetric Data," Wei Hong, Bogdan Georgescu, Xiang Sean Zhou, Sriram Krishnan, Yi Ma, and Dorin Comaniciu, European Conference on Computer Vision (ECCV), Graz, Austria, May 2006.
21. "A Multi-Scale Hybrid Linear Model for Lossy Image Representation," Wei Hong, John Wright, and Yi Ma, in proceedings of the International Conference on Computer Vision (ICCV), 2005.
22. "Hilbert Functions and Applications to the Estimation of Subspace Arrangements," Allen Yang, Yi Ma, and Robert Fossum, in proceedings of the International Conference on Computer Vision (ICCV), 2005.
23. "Segmentation of Hybrid Motions via Generalized Principal Surface Analysis," Shankar Rao, Allen Yang, Andrew Wagner, and Yi Ma, in proceedings of the International Conference on Computer Vision (ICCV), 2005.
24. "Segmentation of a Piece-Wise Planar Scene from Perspective Images," Allen Yang, Shankar Rao, Andrew Wagner, and Yi Ma, in proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2005.
25. "Sparse Representations of Images by Hybrid Linear Models," Kun Huang, Allen Yang and Yi Ma, in Proceedings of the International Conference on Image Processing (ICIP), Singapore, 2004.
26. "Clustering Subspaces by Fitting, Differentiating and Dividing Polynomials," René Vidal and Yi Ma, in Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Washington DC, 2004.
27. "Minimum Effective Dimension for Mixtures of Subspaces: A Robust GPCA Algorithm and its Applications," Kun Huang, Yi Ma, and René Vidal, in Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Washington DC, 2004.
28. "Reconstruction of 3-D Symmetric Curves from Perspective Images without Discrete Features," Wei Hong, Yi Ma, and Yizhou Yu, in Proceedings of the European Conference on Computer Vision (ECCV), Prague, 2004.
29. "A Unified Algebraic Approach to 2-D and 3-D Motion Segmentation via Polynomial Fitting and Differentiating," René Vidal and Yi Ma, Honorable Mention for **the Longuet-Higgins Best Paper Award**, in Proceedings of the European Conference on Computer Vision (ECCV), Prague, 2004.
30. "On Exploiting Occlusions in Multiple-View Geometry," Paolo Favaro, Alessandro Duci, Yi Ma, and Stefano Soatto, International Conference on Computer Vision (ICCV), October, 2003.
31. "Geometric Segmentation of Perspective Images Based on Symmetry Groups," Yang Yang, Shankar Rao, Wei Hong, and Yi Ma, International Conference on Computer Vision (ICCV), October, 2003.
32. "Generalized Principal Component Analysis (GPCA): An Analytic Solution to Segmentation of Mixtures of Subspaces," René Vidal, Yi Ma, and Shankar Sastry, Finalist for the Best Paper Award, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), June, 2003.
33. "Introduction to Multiview Rank Conditions and their Applications: A Review," Jana Košecká and Yi Ma, invited paper, 2002 Tyrrhenian International Workshop on Digital Communications (IWDC 2002), Advanced Methods for Multimedia Signal Processing, Palazzo dei Congressi, Capri, Italy, September 2002.
34. "Interpretation of Dynamic Scenes from the Multibody Fundamental Matrix," René Vidal, Stefano Soatto, Yi Ma, and Shankar Sastry, in Proceedings of the Workshop on Vision and Modelling of Dynamic Scenes, the European Conference on Computer Vision (ECCV), Copenhagen, Denmark, May 2002.
35. "Classifications of Rank Conditions for Multiple View Geometry of Dynamical Scenes," Yi Ma, Kun Huang, and Yang Yang, in Proceedings of the Workshop on Vision and Modeling of Dynamic Scenes, the European Conference on Computer Vision (ECCV), Copenhagen, Denmark, May 2002.

36. "Generalized Rank Conditions in Multiple View Geometry with Applications to Dynamical Scenes," Kun Huang, Robert Fossum, and Yi Ma, in Proceedings of the European Conference on Computer Vision (ECCV), Copenhagen, Denmark, May 2002.
37. "Rank Deficiency Condition of the Multiple View Matrix for Mixed Point and Line Features," Yi Ma, Jana Košecká, and Kun Huang, oral presentation at the fifth Asian Conference on Computer Vision (ACCV), Melbourne, Australia, January 2002.
38. "Recognition of Human Gait," Alessandro Bissacco, Alessandro Chiuso, Yi Ma, and Stefano Soatto, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Hawaii, December, 2001.
39. "Optimal Motion Estimation from Multiview Normalized Epipolar Constraint," René Vidal, Yi Ma, Jana Košecká, and Shankar Sastry, oral presentation at International Conference on Computer Vision (ICCV, 45 out of 596 paper submitted), Vancouver, Canada, July 2001.
40. "Kruppa Equation Revisited: its Degeneracy and Renormalization," Yi Ma, René Vidal, Jana Košecká, and Shankar Sastry, in Proceedings of the 6th European Conference on Computer Vision (ECCV), June 2000.
41. "Optimization Criteria, Sensitivity and Robustness of Motion and Structure Estimation," Yi Ma, Jana Košecká, and Shankar Sastry, in Proceedings of IEEE 7th International Conference on Computer Vision (ICCV) workshop on Vision Theory and Algorithms, Corfu, Greece, September 1999.
42. "Euclidean Reconstruction and Reprojection Up to Subgroups," Yi Ma, Stefano Soatto, Jana Košecká and Shankar Sastry, the **David Marr Best Paper Award**, in Proceedings of the 7th IEEE International Conference on Computer Vision (ICCV), 1999.
43. "Motion Recovery from Image Sequences: Discrete Viewpoint vs. Differential Viewpoint," Yi Ma, Jana Košecká, and Shankar Sastry, in Proceedings of European Conference on Computer Vision (ECCV), Freiburg, Germany, June 1998, vol.2, page 337-53.

• **Conference Papers in Robotics & Systems**

1. "A Closed-Form Solution to the Identification of Hybrid ARX Models via the Identification of Algebraic Varieties," René Vidal and Yi Ma, in Proceedings of the workshop on Hybrid Systems: Control and Computation (HSCC), Switzerland, 2005.
2. "Identification of Hybrid Linear Time-Invariant Systems via Subspace Embedding and Segmentation," Kun Huang, Andrew Wagner, and Yi Ma, in Proceedings of IEEE Conference on Decision and Control (CDC), Bahamas, 2004.
3. "Large Baseline Matching and Reconstruction from Symmetry Cells," Kun Huang, Allen Yang Yang, Wei Hong, and Yi Ma, in Proceedings of the International Conference on Robotics and Automation (ICRA), New Orleans, 2004.
4. "An Algebraic Geometric Approach to the Identification of a Class of Linear Hybrid Systems," René Vidal, Stefano Soatto, Yi Ma, and Shankar Sastry, Finalist for the Best Paper Award, in Proceedings of IEEE Conference on Decision and Control (CDC), Hawaii, 2003.
5. "Structure and Pose from Single Images of Symmetric Objects with Applications to Robot Navigation," Allen Yang Yang, Wei Hong, and Yi Ma, in Proceedings of the International Conference on Robotics and Automation (ICRA), Taipei, Taiwan, 2003
6. "Multiple View Motion Estimation and Control for Landing an Unmanned Aerial Vehicle," Omid Shakernia, Courtney S. Sharp, René Vidal, David H. Shim, Yi Ma, and Shankar Sastry, International Conference on Robotics and Automation (ICRA) 2002.
7. "Vision Guided Landing of an Unmanned Aerial Vehicle," Omid Shakernia, Yi Ma, John Koo, Joao Hespanha, and Shankar Sastry, in Proceedings of IEEE Conference on Decision & Control (CDC), Phoenix, Arizona, December 1999.
8. "A Lie Theoretic Approach to Structure and Motion in Computer Vision," Yi Ma, Omid Shakernia, Jana Košecká, and Shankar Sastry, in Proceedings of the 14th World Congress of International Federation of Automatic Control (IFAC), Beijing, China, July 1999.
9. "Motion Estimation from Two Frames as Optimization on Stiefel Manifolds," Yi Ma, Jana Košecká, and Shankar Sastry, in Proceedings of the 37th IEEE Conferences on Decision & Control (CDC), Tampa, Florida, December 1998.
10. "Free Flight in 2000: Games on Lie Groups," Claire Tomlin, Yi Ma, and Shankar Sastry, in Proceedings of the 37th IEEE Conferences on Decision & Control (CDC), Tampa, Florida, December 1998.

11. "Hierarchical Hybrid System Design on Berkeley Unmanned Autonomous Aerial Vehicle," John Koo, David Shim, Omid Shakernia, Bruno Sinopoli, Yi Ma, Frank Hoffmann, and Shankar Sastry, International Aerial Robotics Competition, Richland, Washington, August 1998.
12. "Optimal Motion From Image Sequences: A Riemannian Viewpoint," Yi Ma, Jana Kořecká, and Shankar Sastry, in Proceedings of Mathematical Theory of Networks and Systems (MTNS), Padova, Italy, July 1998, page 1047-50.
13. "SmartATMS: A Simulator for Air Traffic Management Systems," John Koo, Yi Ma, George Pappas, and Claire Tomlin, in Proceedings of Winter Simulation Conference (WSC), Atlanta, Georgia, December 1997, page 1199-205.
14. "Vision Guided Navigation for a Nonholonomic Mobile Robot," Yi Ma, Jana Kořecká, and Shankar Sastry, in Proceedings of the 36th IEEE Conferences on Decision & Control (CDC), San Diego, California, December 1997, vol.3, page 3069-74.

- **Patents:**

1. Recognition via High-Dimensional Data Classification, USPTO No. 61025039, January 31, 2008.

5 ACADEMIC ACTIVITIES AND SERVICES

- **Invited Lectures:**

1. "Robust Principal Component Analysis via Convex Optimization," talk at MSRA Technical Advisory Board Review, China, November 2, 2009.
2. "Confluence of Computer Vision and Sparse Representation," Invited talk at CAD & CG state key lab, Zhejiang University, China, October 22, 2009.
3. "Multiple-View Geometry and Symmetry for Image-Based 3D Reconstruction," Keynote speech at ACCV workshop on Community Based 3D Content and its Applications in Mobile Internet Environment, September 24, 2009.
4. "Confluence of Computer Vision and Sparse Representation," Invited talk National Taiwan University, Taiwan, August 28, 2009.
5. "Robust Principal Component Analysis via Convex Optimization," Invited talk Academia Sinica, Institute of Information Science, Taiwan, August 27, 2009.
6. "Robust Principal Component Analysis via Convex Optimization," Invited talk at National Tsinghua University, Taiwan, August 26, 2009.
7. "Confluence of Computer Vision and Sparse Representation," Keynote speech at the 22th IPPR Conference on Computer Vision, Graphics, and Image Processing, Taiwan, August 24, 2009.
8. Keynote speech at International Workshop on Local and Non-Local Approximation in Image Processing, Finland, August 19-21, 2009.
9. Invited talk at Intl. Conf. Sampling Theory and Applications, Marseille, France, May 18-22, 2009.
10. Plenary talk at Picture Coding Symposium, Chicago, USA, May 6-8, 2009.
11. "Subspace Arrangements and Manifold Learning," invited talk at Workshop on Multi-Manifold Data Modeling and Applications, Institute for Mathematics and Its Applications, October 27-30 2008.
12. "Compressed Sensing and Its Applications in Pattern Recognition and Computer Vision," mini-course at Microsoft Research Asia, Beijing, August, 2008.
13. "Subspace Segmentation via Lossy Data Compression," invited talk at SIAM Conference on Imaging Science, Minisymposium on Hybrid Linear and Nonlinear Modeling and its Applications, July 7-9, 2008.
14. "Sparse Representation-based Classification and its Applications," invited talk at SIAM Conference on Imaging Science, Minisymposium on Locally Adaptive Patch-based Image and Video Restoration, July 7-9, 2008.
15. "Robust Face Recognition via Sparse Representation," invited talk at Microsoft Research, Redmond, March 11, 2008.
16. "Sparse Representation-based Classification and its Applications," invited talk at Systemes Seminar, Department of Electrical and Computer Engineering, University of Wisconsin at Madison, February 27, 2008.

17. "Face Recognition via Sparse Representation," invited talk at von Neumann Symposium of Applied Mathematics, Snowbird, Utah, July 8, 2007.
18. "Clustering and Classification via Lossy Data Compression," Computer Science Department, Stanford University, May 17, 2007.
19. "Face Recognition via Sparse Representation," Computer Vision Seminar, EECS Department, University of California at Berkeley, May 8, 2007.
20. "Face Recognition via Sparse Representation," Computer Vision Seminar, Computer Science Department, University of California at San Diego, May 4, 2007.
21. "Clustering and Classification via Lossy Data Compression," Computer Vision Group Seminar, Electrical Engineering Department, California Institute of Technology, May 2, 2007.
22. "Clustering and Classification via Lossy Data Compression," Computer Science Department Seminar, University of California at Los Angeles, May 1, 2007.
23. "Face Recognition via Sparse Representation," CSAIL Computer Vision Seminar, EECS Department, Massachusetts Institute of Technology, April 25, 2007.
24. "Clustering and Classification via Lossy Data Compression," LIDS Special Seminar, EECS Department, Massachusetts Institute of Technology, April 25, 2007.
25. "Clustering and Classification via Lossy Data Compression," GRASP Laboratory Seminar, University of Pennsylvania, March 23, 2007.
26. "Clustering and Classification via Lossy Data Compression," Center for Imaging Science Seminar, Johns Hopkins University, March 20, 2007.
27. "Clustering and Classification via Lossy Data Compression," Computer Vision Seminar, EECS Department, University of California at Berkeley, March 7, 2007.
28. "Clustering and Classification via Lossy Data Compression," Fessenden Lecture and Graduate Seminar, Electrical & Computer Engineering Department, IEEE EMB Society Pittsburgh Chapter, University of Pittsburgh, February 28, 2007.
29. "Clustering and Classification via Lossy Data Compression," Machine Vision Seminar, Computer Science Department, Carnegie Mellon University, February 26, 2007.
30. "Clustering and Classification via Lossy Data Compression," Mathematics Department, University of Michigan, February 6, 2007.
31. "Clustering and Classification via Lossy Data Compression," Electrical Engineering and Computer Science Department, University of Michigan, February 5, 2007.
32. "Clustering and Classification via Lossy Data Compression," Electrical Engineering and Computer Science Department, Northwestern University, January 25, 2007.
33. "How Did I Learn to Do Research, or Did I?" Intern Training Seminar, Microsoft Research Asia, Beijing, China, December 8, 2006.
34. "Segmentation of Multivariate Mixed Data via Lossy Data Compression," Department of Automation, Tsinghua University, China, September 22, 2006.
35. "Segmentation of Multivariate Mixed Data via Lossy Data Compression," School of Electronics Engineering and Computer Science, Beijing University, China, September 18, 2006.
36. "Segmentation of Multivariate Mixed Data via Lossy Data Compression," Department of Electronics, Tsinghua University, China, August 31, 2006.
37. "Image, Geometry and Symmetry," international workshop on Current Trends in Computer Vision, panel on "Geometric Vision," Lhasa of Tibet, China, August 10, 2006.
38. "Video Segmentation via Lossy Data Compression," international workshop on Current Trends in Computer Vision, panel on "Dynamical Vision," Lhasa of Tibet, China, August 10, 2006.
39. "Segmentation of Multivariate Mixed Data," Computer Science Department, Zhejiang University, Hangzhou, China, July 12, 2006.
40. "Segmentation of Multivariate Mixed Data," Microsoft Research Asia, Beijing China, June 24, 2006.
41. "Modeling and Segmentation of Multivariate Mixed Data," EECS Department Colloquium, UC Berkeley, April 12, 2006.
42. "Segmentation of Multivariate Mixed Data," Mathematics Department Graduate Seminar, University of Illinois at Urbana-Champaign, April 5, 2006.
43. "Segmentation of Multivariate Mixed Data," Nonlinear Control Seminar, Coordinated Science Laboratory, University of Illinois at Urbana-Champaign, March 29, 2006.

44. "Segmentation of Multivariate Mixed Data," Statistics Department Seminar, University of Illinois at Urbana-Champaign, March 9, 2006.
45. "Multi-Scale Hybrid Linear Models for Image Representation," Robotics Lab Seminar, EECS Department, University of California at Berkeley, June 14, 2005.
46. "Vision, Geometry, and Symmetry," Institute of Computer Science, Sichuan University, Chendu, China, May 30, 2005.
47. "Multi-Scale Hybrid Linear Models for Lossy Image Representation," Automation Department Seminar, Tsinghua University, Beijing, China, May 19, 2005.
48. "Motion-Based Image Segmentation," Microsoft Research in Asia, Beijing, China, May 19, 2005.
49. "Multi-Scale Hybrid Linear Models for Lossy Image Representation," Microsoft Research in Asia, Beijing, China, May 18, 2005.
50. "Generalized Principal Component Analysis and Its Applications," Computer Science Department, Tsinghua University, Beijing, China, May 17, 2005.
51. "Motion-Based Image Segmentation," Human/Computer Vision Symposium, Beckman Institute, May 13, 2005.
52. "Multi-Scale Hybrid Linear Models for Lossy Image Representation," vision/graphics/HCI day, Computer Science Department, University of Illinois, April 15, 2005.
53. "Identification of Hybrid ARX Systems," Control Seminar, Coordinated Science Laboratory, University of Illinois, February 2, 2005.
54. "Vision, Geometry, and Symmetry," the Center for Imaging Science, Johns Hopkins University, November 16, 2004.
55. "Generalized Principal Component Analysis and its Applications," the ITG forum of Beckman Institute, UIUC, September 21, 2004.
56. "Generalized Principal Component Analysis and its Applications," Control and Robotics Seminar, EECS, UC Berkeley, August 2004.
57. "Geometric Vision," invited one-day lectures, World Congress on Intelligent Control and Automation, Hangzhou, China, June 14-18, 2004.
58. "Generalized Principal Component Analysis," DSP seminar, ECE UIUC, April 2004.
59. "Vision, Geometry, and Symmetry," the Center for Automation Research, University of Maryland, May 9th, 2003.
60. "Image and Geometry," the Applied Mathematics Seminar, Mathematics Department, UIUC, March 3, 2003.
61. "Image and Geometry," the DSP seminar, UIUC, December 11, 2002.
62. "Group Symmetry and Multiple View Geometry," Berkeley AI/ Robotics/Vision Seminar, Robotics Group, September 19, 2002.
63. "Multiple-View Multibody Structure from Motion," Center for Intelligent and Networked Systems, Automation Department, Tsinghua University, Beijing (China), May 24, 2002.
64. "Multiple-View Multibody Structure from Motion," Microsoft Research in Asia, Beijing (China), May 22, 2002.
65. "Multiple-View Multibody Structure from Motion," Microsoft Research, Redmond, May 17, 2002.
66. "Multiple-View Multibody Structure from Motion," Special computer vision seminar, UIUC, May 8, 2002.
67. "Computer and Robot Vision," ECE Department Explorations Seminar, UIUC, February 20th, 2002.
68. "Rank Conditions in Multiple View Geometry," Visual Computation Group Seminar, Microsoft Research in Asia, Beijing, February 4th, 2002.
69. "Recognition of Human Gait," Image Formation and Processing Group, Beckman Institute, January 18, 2002.
70. "Overview of Multiple View Geometry," Math & ECE RAP program, Beckman Institute, UIUC, January 18, 2002.
71. "Rank Conditions in Multiple View Geometry," GRASP Lab Seminar, University of Pennsylvania, November 2, 2001.
72. "Rank Conditions in Multiple View Geometry," EECS Department, AI Lab Colloquium, MIT, November 1, 2001.

73. “Rank Conditions in Multiple View Geometry,” Robotics Lab, DEAS, Harvard University, November 1, 2001.
74. “Multiple View Geometry Unified,” EE Department, Stanford University, May 17, 2001.31.
75. “Multiple View Geometry Unified,” EECS Department Computer Vision Seminar, UC Berkeley, May 16, 2001.
76. “Multiple View Geometry Unified,” CSL Nonlinear Control Seminar, UIUC, May 10, 2001.
77. “Vision Based Control,” ECE Department Graduate Seminar, UIUC, November 2, 2000.

• **Workshops, Tutorials, Seminars, and Projects (as Organizer):**

1. Organizer of a one-day workshop on *Dynamical Vision* at International Conference on Computer Vision, Kyoto, Japan, September 29, 2009.
2. Organizer of a half-day tutorial on *Sparse Representation and Its Applications in High-Dimensional Pattern Recognition* at International Conference on Computer Vision and Pattern Recognition, Miami, USA, June 20, 2009.
3. Organizer of a half-day tutorial on *Generalized Principal Component Analysis* at the International Conference on Computer Vision and Pattern Recognition, June 23, 2008.
4. Organizer of a half-day tutorial on *Computational Symmetry* at the International Conference on Computer Vision and Pattern Recognition, June 23, 2008.
5. Organizer of a one-day workshop on *Dynamical Vision* at the International Conference on Computer Vision, October 2007.
6. Organizer of a half-day tutorial on *Generalized Principal Component Analysis* at IEEE International Conference on Computer Vision and Pattern Recognition, Minneapolis, June 18, 2007.
7. Coorganizer of a three-day workshop on *the Current Trends in Computer Vision*, Tibet, China, August 2006.
8. Organizer of a one-day workshop on *Dynamical Vision* at the European Conference on Computer Vision, May 2006.
9. Organizer of a one-day workshop on *Dynamical Vision* at the International Conference on Computer Vision, October 2005.
10. Organizer of a half-day tutorial on *Multiple-View Geometry for Image-Based Modeling* at the International Conference on Image Processing, September 11, 2005.
11. Co-organizer of the invited session: *Hybrid Systems Identification* at the IEEE Conference on Decision & Control, Bahamas, December 2004.
12. Organizer of a one-day course: *Multiple-View Geometry for Image-Based Modeling* at SIGGRAPH’03, San Diego, July 2003, and at SIGGRAPH’04, Los Angeles, August 2004.
13. Co-organizer (with Jana Košecká) of a one-day course: *3-D Reconstruction and Motion Analysis* at ICRA’03, Taipei, Taiwan, September 2003, and at ICRA’04, New Orleans, April 2004.
14. Co-chair of *Geometry and Algebra of Computer Vision*, the *Research Among Peers* (RAP) program with Professor Robert Fossum, Mathematics Department, UIUC, 2002–Present.
15. Organizer and chair of the invited session: *Dynamical Vision and Control* at the Allerton Conference, Illinois, October 2002.
16. Co-organizer and co-chair of the invited session: *Feedback and Control in Biological Systems* at the Allerton Conference, Illinois, October 2001.
17. Co-organizer of the tutorial: *A Geometric Viewpoint to Recovery of Structure and Motion from Image Sequences* at IEEE International Conference on Robotics and Automation (ICRA), San Francisco, April 2000.

• **Research Grants**

1. ONR: Harnessing Sparse and Low-Dimensional Structures for Robust Clustering of Visual Data, PI, \$600,000, Office of Naval Research, 2009-2012.
2. NSF IIS: SGER: Explorations of Robust Image Classification, PI, \$100,000, National Science Foundation, 2008-2009.
3. NSF CISE: PHYSNET: Physical Interaction Using the Internet, co-PI, \$150,000, National Science Foundation, 2007-2010.

4. NSF ECCS: Control and Sensing under Limited Information, co-PI, \$270,000, National Science Foundation, 2007-2010.
5. ONR YIP: Estimation of Hybrid Models in Computer Vision, PI \$300,000, Office of Naval Research, 2005-2008.
6. NSF CRS-EHS: Collaborative Research: An Algebraic Geometric Approach to Hybrid Systems Identification, PI, \$350,000, National Science Foundation, 2005-2008.
7. NSF CCF-TF: Estimation of Hybrid Models as Algebraic Sets, PI, \$230,000, National Science Foundation, 2005-2008.
8. NSF CAREER IIS: Identifying Spatial and Dynamical Patterns from Images, PI, \$400,000, National Science Foundation, 2004-2008.
9. Vision Based Control, PI, \$23,000, UIUC Research Board, 2000.
10. Co-founder of the BErkeley Aerial Robot (BEAR) project, funded by DARPA, ONR, and NSF. EECS Department, U. C. Berkeley, 1997–2000.

• **Professorial Services & Activities:**

1. Guest editor for a special issue on *Real-World Face Recognition*, with Hua Gang et. al., IEEE Transactions on Pattern Analysis and Machine Intelligence, to appear in 2011.
2. Chief guest editor for a special issue on *Dimensionality Reduction via Subspace and Manifold Learning*, with Partha Niyogi, Guillermo Sapiro, and René Vidal, IEEE Signal Processing Magazine, to appear in 2010.
3. Chief Guest Editor for a special issue on *Sparse Representation and Compressive Sensing*, with Emmanuel Candes, Richard Baraniuk, and Michael Elad, the Proceedings of IEEE, 2009.
4. Program Chair, International Conference on Computer Vision, 2013.
5. Associate Editor of Advances in Multimedia, since 2007.
6. Associate Editor of IEEE Transactions on Pattern Analysis and Machine Intelligence, since 2007.
7. Associate Editor of IEEE Control Systems Society Conference Editorial Board (CEB), 2000 – 2004.
8. Affiliated with the *Applied Mathematics Program*, Mathematics Department, University of Illinois at Urbana-Champaign, since 2002.
9. Visiting Researcher at Microsoft Research Asia, Beijing, China, summer of 2002 and 2005.
10. Visiting Senior Researcher at Microsoft Research Asia, Beijing, China, fall 2006.
11. NSF CISE III panel review, 2008.
12. NSF CISE CNS panel review, 2008.
13. NSF ECCS PCAN panel review, June 2007.
14. NSF CISE IIS panel review, March 2007.
15. NSF CISE CRI panel review, November 2, 2005.
16. NSF-IIS CAREER award panel review, November 12, 2004.
17. Member of the Program Committees of the International Conference on Computer Vision, European Conference on Computer Vision, and IEEE Conference on Computer Vision and Pattern Recognition, since 2001.
18. Journal Paper Reviews: *CVIU*, *JMIV*, *IJCV*, *Automatica*, *IEEE Transactions on Information Theory*, *Image Processing*, *PAMI*, and *Robotics & Automation*.
19. Conference Paper Reviews: *CVPR*, *ECCV*, *ICCV*, *ACCV*, *CDC*, *ACC*, *IFAC*, *MTNS*.

• **Professional Societies:**

1. Senior Member of the Institute of Electrical and Electronics Engineers (IEEE).
2. Member of Association for Computing Machinery (ACM).
3. Member of SIAM and ASEE.

• **Teaching Activities:**

1. Faculty member in the Department of Electrical & Computer Engineering, University of Illinois at Urbana-Champaign, 2000-Present. Courses Taught:

- (a) *Sparse Representation and High-Dimensional Geometry*
- (b) *Estimation and Segmentation of Hybrid Models*
- (c) *Advanced Geometric Approach to Computer Vision*
- (d) *Control Systems Theory and Design*
- (e) *Nonlinear System Analysis and Control*
- (f) *Optimum Control Systems*
- (g) *Random and Stochastic Processes*
- (h) *Analogue Signal Processing*

Three times on **the Incomplete List of Teachers Ranked as Excellent** (voted by the students) of the University of Illinois at Urbana-Champaign, Spring 2001, Fall 2002, and Spring 2006.

2. Teaching Associate, *Advanced Topics in Robotics: Computer Vision*, EECS, University of California at Berkeley, Spring 1999.
3. Teaching Assistant, *Stochastic and Random Process Systems*, EECS, University of California at Berkeley, Fall 1997.
4. Teaching Assistant, *Electronic Techniques for Engineering*, EECS, University of California at Berkeley, Spring 1997.

• **Doctoral Students (Graduated):**

1. Kun Huang, PhD in Electrical Engineering, Thesis: *Geometric Principles of Multiple Visual Sensors*, August 2004. Now an assistant professor at the Ohio State University.
2. Wei Hong, PhD in Electrical Engineering, Thesis: *Hybrid Models for Representation of Imagery Data*, May 2006. Now a researcher at Texas Instruments Research Lab.
3. Allen Yang Yang, PhD in Electrical Engineering, Thesis: *Estimation of Subspace Arrangements: Its Algebra and Statistics*, May 2006. Now a research scientist at UC Berkeley.
4. John Wright, PhD in Electrical Engineering, Thesis: *High-Dimensional Data Analysis with Applications in Computer Vision*, May 2009. Now a researcher at Microsoft Research Asia.
5. Shankar Rao, PhD in Electrical Engineering, Thesis: *Harnessing Low-Dimensional and Sparse Structures for High-Dimensional Data Clustering*, May 2009. Now a researcher at HRL Laboratories, LLC, Malibu, California.