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CURRENT

Northwestern University, Evanston, IL
Full Professor
Electrical Engineering & Computer Science 2012–Present

EDUCATION

University of Illinois at Urbana-Champaign (UIUC) Urbana, IL
Ph.D. in Electrical & Computer Engineering, 07/2001
Thesis: *"Vision and Learning for an Intelligent Human–Computer Interaction"*.
(Advisor: Professor Thomas S. Huang)

Tsinghua Univeristy Beijing, China
M.S. in Electrical Engineering (Dept. of Automation), 07/1997
Thesis: *"Image Compression based on Structural Adaptation Self-organizing VQ"*.
(Advisor: Professor Pingfan Yan)

Huazhong University of Science & Technology Wuhan, China
B.E. in Electrical Engineering (Dept. of Automatic Control), 07/1994

INTERESTS

- Computer Vision
- Statistical Learning and Pattern Recognition
- Visual Pattern Discovery and Data Mining
- Image/Video Processing, Analysis, and Understanding
- Perceptual Sensing and Interactions
- Biomedical Image Processing and Medical Applications

EXPERIENCE

□ **Northwestern University**, Evanston, IL
Full Professor with Tenure of EECS 2012–present
Associate Professor with Tenure of EECS 2007–2012
Assistant Professor of Electrical Engineering & Computer Science 2005–2007
Assistant Professor of Electrical and Computer Engineering 2001–2005

□ **University of Illinois at Urbana-Champaign** Urbana, IL
Research Assistant. Advisor: Professor Thomas S. Huang 08/1997–07/2001

□ **Microsoft Research (MSR)** Redmond, WA
Intern Researcher (Vision Technology group) 05/2000–08/2000
Intern Researcher (Vision Technology group) 05/1999–08/1999

□ **Tsinghua University** Beijing, China
Graduate Research Assistant 09/94–07/97

□ **Tsinghua University** Beijing, China
Graduate Teaching Assistant 09/95–02/96

□ **Microsoft Beijing R&D Center** Beijing, China
Intern Software Engineer 06/96–11/96

Honors

□ IEEE Fellow (for his "fundamental contributions to visual motion analysis and visual pattern discovery in computer vision"), 2016.

□ National Science Foundation (NSF), CAREER award, 2004-2009

□ Robert T. Chien Award, University of Illinois at Urbana-Champaign, 2001

□ Schneider Fellowship, Tsinghua University, 1996-1997

□ Guanghua Fellowship, Tsinghua University, 1995-1996

□ Outstanding Undergraduate Award, Huazhong Univ. of Sci.& Tech., 1994

□ Excellent Student Scholarship, Huazhong Univ. of Sci.& Tech., 1990-1994

Activities

□ **Associate Editors**

- IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE-TPAMI), 2012-present
- IEEE Transactions on Image Processing (IEEE-TIP), 2007-2012, 2016-present
- IEEE Transactions on Circuit Systems and Video Technology (IEEE T-CSVT), 2014-present
- IAPR Journal of Machine Vision and Applications (MVA), 2006-present
- IS&T/SPIE Journal of Electronic Imaging (JEI), 2005-present

□ **Guest Editors**

- IEEE Trans. on Pattern Analysis and Machine Intelligence (T-PAMI), 2016
- IEEE Trans. on Circuit Systems and Video Technology (T-CSVT), 2011
- IEEE Signal Processing Magazine (SPM), Special Issue Video Analytics for Surveillance: Theory and Practice, 2009
- EURASIP Journal on Applied Signal Processing (JASP), 2005

□ **Conference Organizers**

- Program Co-Chair, IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), 2017
- Co-director, 2nd Sino-USA Summer School in Vision, Learning and Pattern Recognition, 2010
- Workshop Chair, IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), 2012
- Program Co-Chair, The 3rd Chinese Conference on Intelligent Visual Surveillance, 2011
- Program Co-Chair, The 4th Workshop on Dynamical Vision, 2009
- Local Chair, IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), 2007

□ **Area Chairs**

- IEEE Int'l Conf. on Computer Vision (ICCV), 2009, 2015, 2017
- IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), 2008, 2012
- European Conf. on Computer Vision (ECCV), 2016
- IEEE Int'l Conf. on Image Processing (ICIP), 2008, 2009, 2010, 2012
- ACM Multimedia (ACM MM), 2010

□ **Session Chairs**

- IS&T/SPIE Visual Communications and Image Processing (VCIP), 2007
- IEEE Int'l Conf. on Multimedia and Expo (ICME), 2007

□ **Panelists**

- National Science Foundation (NSF), CISE IIS division, 2003, 2004, 2005, 2007, 2008, 2009, 2010, 2011, 2013, 2014, 2015, 2016

□ **Program Committees** on the following conferences:

- IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), 2003-2015
- IEEE Int'l Conf. on Computer Vision (ICCV), 2003,2007, 2009, 2011, 2013, 2015
- European Conf. on Computer Vision (ECCV), 2004, 2006, 2008, 2010, 2012, 2014
- IEEE Int'l Conf. on Multimodal Interfaces, 2010
- Asian Conf. on Computer Vision (ACCV), 2004, 2006
- IEEE Int'l Conf. on Multimedia & Expo, 2007, 2010
- Int'l Conf. on Pattern Recognition (ICPR), 2006
- IEEE Workshop on Motion & Video Computing (WMCV), 2002,2007
- IEEE Workshop on Dynamical Vision (WDV), 2005, 2006, 2007
- IEEE Workshop on Real-Time Vision for HCI (RTV4HCI), 2004, 2005
- Int'l Workshop on Gesture in HCI and Simulation (GW), 2001, 2007
- ACM Workshop on Video Surveillance and Sensor Networks (VSSN), 2004, 2005
- IAPR 5-th Int'l Workshop on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR), 2007

GRANTS

[F-1]. **PI**:"Integrated Learning-based and Regularization-based Super-Resolution for Extreme MWIR Image Enhancement", **Department of Defense (DoD)**, Navy SBIR/STTR, 6/1/2017-6/30/2018, $90,000.

[F-2]. **PI**:"Modeling and Learning Visual Similarity Under Adverse Visual Conditions", **National Science Foundation (NSF)**, IIS-1619078, 9/1/2016 - 8/31/2019, $440,000.

[F-3]. **PI**: "Handling Adverse Visual Conditions for Target Tracking and Recognition", **Army Research Office (ARO)**, 4/1/2016-3/31/2019, $447,424.

[F-4]. **PI**: "Human-Centric Video Analytics (HCVA): People Detection and Identity Matching", **ChangHong Inc.**, 6/1/2016-5/31/2018, $140,000

[F-5]. **PI**: "STIR: Visual Tracking and Identification of Targets in Limited Spatial Resolution", **Army Research Office (ARO)**, 9/1/2015-5/31/2016, $50,000.

[F-6]. **PI**: "Integrating Explicit Image Regularization and Implicit Learned Knowledge for Single-Frame Image Super-Resolution", **Samsung Advanced Institute of Technology**, 10/1/2013-12/31/2014, $100,000.

[F-7]. **PI**: "Mining and Learning Visual Contexts for Video Scene Understanding", **National Science Foundation (NSF)**, IIS-1217302, 8/1/2012 - 7/31/2015, $428,880.

[F-8]. **PI**: "Computational Models for Context-Awareness and Selective Attention for Persistent Visual Target Tracking", **National Science Foundation (NSF)**, IIS-0916607, 9/1/2009 - 8/31/2015, $375,986.

[F-9]. **Co-PI**: "MRI: Equipment Development: Bimanual Robotic Manipulation and Sensory Workspace",**National Science Foundation (NSF)**, CNS-1229566, 9/1/2012 - 8/31/2014, $400,000, jointly with Kevin Lynch, J. Edward Colgate, Todd Murphey and Brenna Argall.

[F-10]. **Co-PI**: "MSEE on A Unified Foundation for Representation, Inference and Learning", **The Defense Advanced Research Projects Agency (DARPA)**, 9/26/2011-9/26/2015, $280,000 on NU share.

[F-11]. **PI**: "Sino-USA Summer School in Vision, Learning and Pattern Recognition", **National Science Foundation (NSF)**, IIS-1037944, 7/1/2010-6/30/2012, $25,000.

[F-12]. **PI**: "Collaborative and Persistent Target Tracking and Acquisition", **Army Research Office (ARO)**, 9/2008-8/2012, $300,000.

[F-13]. **PI**: "Wide Area Motion Deblurring", **The Defense Advanced Research Projects Agency (DARPA)**, 9/2008-3/2012, $103,000.

[F-14]. **PI**: "Vision-based Articulated Finger Motion Analysis for Hand Rehabilitation", **National Institutes of Health (NIH)**, subcontract of Rehabilitation Institute of Chicago (RIC), 1/2007-12/2008, $100,000, jointly with A. K. Katsaggelos.

[F-15]. **PI**: "CAREER: Visual Analysis of High-Dimensional Motion: A Distributed/Collaborative Approach", **National Science Foundation (NSF)**, IIS-0347877, 2/2004–1/2012, $475,000.

[F-16]. **PI**: "Transductive Learning for Retrieving and Mining Visual Contents", **National Science Foundation (NSF)**, IIS-0308222, 9/2003–2/2008, $281,702.

[F-17]. **PI**: "Analyzing Video Scenes and Activities for Content-Aware Video Conferencing", **Motorola Center for Seamless Communications**, 9/2007-8/2010, $180,000, jointly with A. K. Katsaggelos.

[F-18]. **Co-PI**: "A Distributed Cognitive Information Processing System", **National Science Foundation (NSF)**, IIS-0515929, 3/2005-2/2007, $206,800, jointly with T. Pappas and A. K. Katsaggelos.

[F-19]. **Co-PI**: "Collaborative Research: High-Performance Techniques, Designs and Implementation of software Infrastructure for Change Detection and Mining", **National Science Foundation (NSF)**, IIS-0536994, 9/2005-8/2008, $514,450, jointly with A. Choudhary, A. K. Katsaggelos, G. Memik and S. Memik.

[F-20]. **PI**: "Computer Vision: Software and Hardware", **Motorola Science Advisory Board Associates (SABA)** UPR Fellowship, 9/2004–8/2008, $142,848.

[F-21]. **PI**: "Video-based Activity Analysis", **NEC Labs America**, 1/2008-1/2009, $50,000, unrestricted gift.

[F-22]. **PI**: "Unsupervised Learning for Object-Level Video Pattern Discovery", **Eastman Kodak Company**, 6/2007-6/2008, $50,000, unrestricted gift.

[F-23]. **Co-PI**: Audio/Video Databases and Architectures for Improving Recognition of Reduced Waveforms", **Motorola Center for Seamless Communications**, 9/2007-8/2010, $180,000, jointly with J. Pierrehumbert, W. Horton and A. K. Katsaggelos.

[F-24]. **PI**: "Visual Motion Analysis for Next Generation of Multimedia Communications", **Motorola Center for Telecommunications**, 9/2004–8/2007, $160,000, jointly with A. K. Katsaggelos.

[F-25]. **PI**: "Robust Face/Head Tracking in Video Sequences", **Omron Corp., Japan**, 11/2004–11/2006, $160,000.

[F-26]. **Co-PI**: "Audio-Visual Interaction for Multimedia Communications", **Motorola Center for Telecommunications**, 9/2002–8/2005, $250,500, jointly with A. Katsaggelos.

[F-27]. **PI**: "Perceptual PowerPoint", Gift funds from Alumnae Board of Northwestern University, 3/2004, $3,000.

Teaching

[T-1]. EECS 433 *Statistical Pattern Recognition* **(new course developed)**
Fundamental and advanced topics in statistical pattern recognition including Bayesian decision theory, Maximum-likelihood and Bayesian estimation, Nonparametric density estimation, Component Analysis and Discriminants, Kernel machines, Feature selection, dimension reduction and embedding, Boosting, Minimum description length, Mixture models and clustering, Spectral clustering, Bayesian network and Hidden Markov models, with the applications to image and video pattern recognition.

[T-2]. ECE432 *Advanced Computer Vision* **(new course developed)**
Low-level vision, image formation, stereo, 3D reconstruction, motion analysis and visual tracking, image/motion segmentation, object detection and recognition, human motion analysis, pattern recognition and statistical learning.

[T-3]. ECE332 *Introduction to Computer Vision* **(course reformed and redeveloped)**
Camera models, image formation, binary image analysis, edge detection, color, texture, image segmentation, optical flow, visual tracking, geometry, and stereo.

[T-4]. ECE510 *Computer Vision Seminar* **(new course developed and introduced)**
Selected topics in computer vision including low-level vision, 3D geometry, motion estimation, non-rigid motion analysis, motion segmentation, object detection and recognition, event recognition, manifold learning, graphical models.

[T-5]. ECE230 *Programming for Computer Engineers*
Basic data types and control structures, object-oriented programming, addressing, pointers and references, C/C++ program design, classes, constructors and destructors, derived class, polymorphism, basic sort and search algorithms, code debugging.

Patents

[P-1]. Co-inventor with Shengyang Dai, Mei Han, Wei Xu and Yihong Gong, "Soft Edge Smoothness Prior and its Application on Alpha Channel Super Resolution", Patent pending, 2007

[P-2]. Co-inventor with Ming Yang, Shengyang Dai, Shihong Lao, "Robust Object Tracking System", Patent pending, No.15115/230001, filed on 06/2006.

[P-3]. Co-inventor with Dr. Zhengyou Zhang, Dr. Ying Shan and Dr. Steven Shafer, "VisualPanel: Toward A Vision-Based Mobile Input Interface For Anywhere", Patent pending, filed on 09/2000.

[P-4]. Co-inventor with Dr. Kentaro Toyama, "A System and Method for Estimating the Orientation of an Object", US Patent No.09/408745, filed at 09/30/1999.

Publications

Google Citation

`https://scholar.google.com/citations?user=zAlz89wAAAAJ&hl=en`

Book and Book Chapters

[B-1]. Jiang Wang, Zicheng Liu and Ying Wu, "Human Action Recognition with Depth Cameras", Springer, 2015, ISBN: 978-3-319-04561-0

[B-2]. Ming Yang and Ying Wu, "Context-aware and Attentional Visual Tracking", VDM Verlag Dr. Muller, 2010, ISBN: 978-3-639-24303-1.

[B-3]. Junsong Yuan and Ying Wu, "Common Pattern Discovery in Multimedia Data Mining", in Encyclopedia of Data Warehousing and Mining (2nd Edition), Edited by J. Wang, Idea Group Inc., 2008.

[B-4]. Qi Tian, Ying Wu, Jerry Yu and Thomas S. Huang, "Self-Supervised Learning Based on Discriminative Nonlinear Features and Its application for Image Retrieval", Managing Multimedia Semantics, edited by Uma Srinivasan and Surya Nepal, ICT Centre CSIRO, Australia, by Idea Group, Inc., 2004.

[B-5]. Ying Wu, John Y. Lin and Thomas S. Huang, "Visual Hand Gesture Analysis and Synthesis", in Army Research Lab Computer Science Handbook, 2000

Journal Papers (published)

[J-1]. Bing Su, Jiahuan Zhou, Xiaoqing Ding and Ying Wu, "Unsupervised Hierarchical Dynamic Parsing and Encoding for Action Recognition", *IEEE Trans. on Image Processing* (**T-IP**), 2017,

[J-2]. Bing Su, Xiaoqing Ding, Changsong Liu, Hao Wang and Ying Wu, "Discriminative Transformation for Multi-dimensional Temporal Sequences", *IEEE Trans. on Image Processing* (**T-IP**), 2017.

[J-3]. Bing Su, Xiaoqing Ding, Hao Wang and Ying Wu, "Discriminative Dimensionality Reduction for Multi-Dimensional Sequences", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), Vol.39, 2017.

[J-4]. Wei Tang, Zhenwei Shi, Ying Wu and Changshui Zhang, "Sparse Unmixing of Hyperspectral Data Using Spectral A Priori Information", *IEEE Trans. on Geoscience and Remote Sensing* (**T-GRS**), Vol.53, No.2, 2015.

[J-5]. Zhenyu An, Zhenwei Shi, Ying Wu and Changshui Zhang, "A Novel Unsupervised Approach to Discovering Regions of Interest in Traffic Images", *Pattern Recognition*, Vol.48, No.8, pp.2581-2591, 2015,

[J-6]. Wei Tang, Zhenwei Shi and Ying Wu, "Regularized Simultaneous Forward-backward Greedy Algorithm for Sparse Unmixing of Hyperspectral Data", *IEEE Trans. on Geoscience and Remote Sensing* (**T-GRS**), Vol.52, No.9, 2014

[J-7]. Hongxing Wang, Junsong Yuan and Ying Wu, "Context-Aware Discovery of Visual Co-occurrence Patterns", *IEEE Trans. on Image Processing* (**T-IP**), 2014.

[J-8]. Xiaohui Shen, Zhe Lin, Jonathan Brandt and Ying Wu, "Spatially-Constrained Similarity Measure for Large-Scale Object Retrieval", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), 2013.

[J-9]. Jiang Wang, Zicheng Liu and Ying Wu, "Learning Actionlet Ensemble for 3D Human Action Recognition", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), 2013.

[J-10]. Ilya Mikhelson, Philip Lee, Alan Sahakian, Ying Wu and Aggelos K. Katsaggelos, "Automatic, Fast, Online Calibration between Depth and Color Cameras", *Journal of Visual Communication and Image Representation*, Vol.25, No.1, pp.218-226, 2014.

[J-11]. Jialue Fan, Xiaohui Shen and Ying Wu, "What are We Tracking: A Unified Approach of Tracking and Recognition", *IEEE Trans. on Image Processing* (**T-IP**), 2012.

[J-12]. Heng Su, Nan Jiang, Ying Wu and Jie Zhou, "Single Image Super-resolution Based on Space Structure Learning", *Pattern Recognition Letter*, 2013.

[J-13]. Jialue Fan, Xiaohui Shen and Ying Wu, "Scribble Tracker: A Matting-based Approach for Robust Tracking", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), 2012.

[J-14]. Xiaohui Shen Gang Hua, Lance Williams and Ying Wu, "Dynamic Hand Gesture Recognition: An Exemplar-based Approach from Motion Divergence Fields", *Image and Vision Computing* (**IVC**) special issue on Best of FG'2011, 2012.

[J-15]. Heng Su, Ying Wu and Jie Zhou, "Super-resolution without Dense Flow", *IEEE Trans. on Image Processing* (**T-IP**), 2012.

[J-16]. Nan Jiang, Heng Su, Wenyu Liu and Ying Wu, "Discriminative Metric Preservation for Tracking Low Resolution Targets", *IEEE Trans. on Image Processing* (**T-IP**), 2012.

[J-17]. Junsong Yuan, Gangqiang Zhao, Yun Fu, Zhu Li, Aggelos K. Katsaggelos and Ying Wu, "Discovering Thematic Objects in Images and Videos: a Bottom-up Approach", *IEEE Trans. on Image Processing* (**T-IP**), 2012.

[J-18]. Junsong Yuan and Ying Wu, ""Mining Visual Collocation Patterns via Self-Supervised Subspace", *IEEE Trans. on Systems, Man, and Cybernetics: Part B* (**T-SMCB**), 2012.

[J-19]. Heng Su, Liang Tang, Ying Wu, Daniel Tretter and Jie Zhou , "Spatially Adaptive Block-based Super-resolution", *IEEE Trans. on Image Processing* (**T-IP**), 2012.

[J-20]. Gangqiang Zhao, Junsong Yuan, Jiang Xu and Ying Wu, "Discovery of the Thematic Object in Commercial Videos", *IEEE Multimedia Magazine*, 2011

[J-21]. Junsong Yuan, Zicheng Liu and Ying Wu, "Discriminative Video Pattern Search for Efficient Action Detection", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), 2011.

[J-22]. Nan Jiang, Wenyu Liu and Ying Wu, "Learning Adaptive Metric for Robust Visual Tracking", *IEEE Trans. on Image Processing* (**T-IP**), Vol.13, Feb. 2011.

[J-23]. Jiang Xu, Junsong Yuan and Ying Wu, "Learning Spatio-Temporal Dependency of Local Patches for Complex Motion Segmentation", *Computer Vision and Image Understanding* (**CVIU**), 2011.

[J-24]. Jie Zhou and Dingrui Wan and Ying Wu, "Chameleon-like Binocular Vision System for Visual Surveillance", *IEEE Signal Processing Magazine* (**SPM**), Vol.27, No.5, pp.91-101, Sept. 2010.

[J-25]. Jialue Fan, Wei Xu, Ying Wu and Yihong Gong, "Human Tracking Using Convolutional Neural Networks", *IEEE Trans. on Neural Networks*(**T-NN**), Vol.21, No.10, pp.1610-1623, October 2010.

[J-26]. Junsong Yuan, Jiebo Luo and Ying Wu, "Mining Compositional Features from GPS and Visual Cues for Event Recognition in Photo Collections", *IEEE Trans. on Multimedia* (**T-MM**), Vol.12, No.7, pp.705-716, November 2010.

[J-27]. Ming Yang, James Crenshaw, Bruce Augustine, Russell Mareachen and Ying Wu. "Adaboost-based Face Detection for Embedded Systems", *Computer Vision and Image Understanding* (**CVIU**), Vol.114, No.11, pp.1116-1125, November 2010.

[J-28]. Hongbo Jiang, Wenping Liu, Dan Wang, Chen Tian, Xiang Bai, Xue Liu, Ying Wu and Wenyu Liu, "Connectivity-Based Skeleton Extraction in Wireless Sensor Networks", *IEEE Trans. Parallel Distributed Systems* (**T-PDS**), Vol.21, No.5, pp.710-721, May 2010.

[J-29]. Ming Yang, Gang Hua and Ying Wu, "Context-Aware Visual Tracking", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), vol.31, no.7, pp.1195-1209, July 2009.

[J-30]. Ming Yang, Zhimin Fan, Jialue Fan and Ying Wu, "Tracking Non-stationary Visual Appearances by Data-driven Adaptation", *IEEE Trans. on Image Processing* (**T-IP**), vol.18, no.7, pp.1633-1644, July 2009.

[J-31]. Shengyang Dai, Mei Han, Wei Xu, Ying Wu, Yihong Gong and Aggelos K. Katsaggelos, "SoftCut: A Soft Edge Smoothness Prior for Color Image Super Resolution", *IEEE Trans. on Image Processing* (**T-IP**), vol.18, no.5, pp.969-981, May 2009.

[J-32]. Fan Jiang, Ying Wu and Aggelos K. Katsaggelos, "A Dynamic Hierarchical Clustering Method for Trajectory-Based Unusual Video Event Detection", *IEEE Trans. on Image Processing*, (**T-IP**), vol.18, no.4, pp.907-913, April 2009.

[J-33]. Junsong Yuan, Jingjing Meng, Ying Wu, Jiebo Luo, "Mining Recurring Events through Growing a Forest", *IEEE Transactions on Circuits and Systems for Video Technology* (**T-CSVT**), vol.18, no.11, pp.1597-1607, Nov. 2008.

[J-34]. Yun Fu, Zhu Li, Junsong Yuan, Ying Wu, and Thomas S. Huang, "Locality vs. Globality: Query-Driven Localized Linear Models for Facial Image Computing", *IEEE Transactions on Circuits and Systems for Video Technology* (**T-CSVT**), vol.18, no.12, pp.1741-1752, Dec. 2008.

[J-35]. Gang Hua and Ying Wu, "A Decentralized Probabilistic Approach to Articulated Body Tracking", Journal of Computer Vision and Image Understanding (**CVIU**), vol.108, no.3, pp. 272-283, Dec. 2007.

[J-36]. Zhimin Fan, Ming Yang and Ying Wu, "Multiple Collaborative Kernel Tracking", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), vol.29, No.7, pp.1268-1273, July 2007.

[J-37]. Gang Hua, Zicheng Liu, Zhengyou Zhang and Ying Wu, "Iterative Local-Global Energy Minimization for Automatic Extraction of Objects of Interest", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), vol.28, no.10, pp.1701-1706, Oct. 2006.

[J-38]. Ying Wu and Ting Yu, "A Field Model for Human Detection and Tracking", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), vol.28, no.5, pp. 753-765, May 2006.

[J-39]. Zhimin Fan, Jie Zhou and Ying Wu, "Multibody Grouping by Inference of Multiple Subspaces from High-Dimensional Data Using Oriented-Frames", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), vol. 28, no.1, pp. 90-105, Jan. 2006.

[J-40]. Gang Hua and Ying Wu, "Sequential Mean Field Variational Analysis of Structured Deformable Shapes", *Computer Vision and Image Understanding* (**CVIU**), vol.101, no.2, pp. 87-99, Feb. 2006

[J-41]. Ying Wu, John Lin and Thomas S. Huang, "Analyzing and Capturing Articulated Hand Motion in Image Sequences", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), vol.27, no.12, pp. 1910-1922, Dec. 2005.

[J-42]. Gang Hua and Ying Wu, "Variational Maximum a Posteriori by Annealed Mean Field Analysis", *IEEE Trans. on Pattern Analysis and Machine Intelligence* (**T-PAMI**), vol.27, no.11, pp. 1747-1761, Nov. 2005

[J-43]. Qi Tian, Ying Wu, Jerry Yu and Thomas S. Huang, "Self-Supervised Learning Based on Discriminative Nonlinear Features and Its Applications for Pattern Classification", *Pattern Recognition*, Vol.38, No.6, pp. 903-917, 2005

[J-44]. Ying Wu and Thomas S. Huang, "Robust Visual Tracking by Integrating Multiple Cues Based on Co-Inference Learning", *Int'l Journal Computer Vision* (**IJCV**), Vol.58, No. 1, June 2004

[J-45]. Ying Wu and Thomas S. Huang, "Towards Self-Exploring Discriminating Features for Visual Learning", *Journal of Engineering Application on Artificial Intelligence* (**EAAI**), Vol.15, pp. 139-150, 2002

[J-46]. Ying Wu and Thomas S. Huang, "Non-stationary Color Tracking", *IEEE Trans. on Neural Networks* (**T-NN**), Vol.13, No.4, July, pp. 948-960, 2002.

[J-47]. Ying Wu and Thomas S. Huang, "Human Hand Modeling, Analysis and Animation in the Context of Human Computer Interaction", *IEEE Signal Processing Magazine* (**SPM**), Vol.18, No.3, May, pp. 51-60, 2001.

[J-48]. Ying Wu and Pingfan Yan, "A Study on Structured Adapting Self-Organizing Neural Network", *Acta-Electronica-Sinica*, Vol.27, pp. 55-58, 1999

[J-49]. Yuxing Yang, Ying Wu. et.al. "The Portable Emergency ECG Monitor Based on Graphic LCD", *Chinese Journal of Medical Instrumentation*, Vol.19, No.2, pp. 67-72, 1995.

Referred Conference Papers

⋆ Part I: Selected Papers in CVPR/ICCV/ECCV

[C-1]. Jiahuan Zhou, Pei Yu, Wei Tang and Ying Wu, "Efficient Online Local Metric Adaptation via Negative Samples for Person Re-Identification", in *IEEE Int'l Conf. on Computer Vision* **(ICCV'17)**, Venice, Italy, Oct. 2017.

[C-2]. Wei Tang, Pei Yu, Jiahuan Zhou and Ying Wu, "Towards a Unified Compositional Model for Visual Pattern Modeling", in *IEEE Int'l Conf. on Computer Vision* **(ICCV'17)**, Venice, Italy, Oct. 2017.

[C-3]. Bing Su, Jiahuan Zhou, Hao Wang and Ying Wu, "Hierarchical Dynamic Parsing and Encoding for Action Recognition", in *Proc. European Conf. on Computer Vision* **(ECCV'16)**, Amsterdam, Netherlands, Oct. 2016.

[C-4]. Pei Yu, Jiahuan Zhou and Ying Wu, "Learning Reconstruction-based Gaze Estimation", in *Proc. IEEE Conf. on Computer Vision and Pattern Recognition* **(CVPR'16)**, Las Vegas, NV, June 2016.

[C-5]. Bing Su, Xiaoqing Ding, Changsong Liu and Ying Wu, "Heteroscedastic Max-Min Distance Analysis", in *Proc. IEEE Conf. on Computer Vision and Pattern Recognition* **(CVPR'15)**, Boston, MA, June 2015.

[C-6]. Jiang Wang, Xiaohan Nie, Yin Xia, Ying Wu and Song-Chun Zhu, "Cross-view Action Modeling, Learning and Recognition", in *Proc. IEEE Conf. on Computer Vision and Pattern Recognition* **(CVPR'14)**, Columbus, Ohio, June 2014.

[C-7]. Jiang Wang, Yang Song, Thomas Leung, Chuck Rosenberg, Jingbin Wang, James Philbin, Bo Chen and Ying Wu, "Learning Fine-grained Image Similarity with Deep Ranking", in *Proc. IEEE Conf. on Computer Vision and Pattern Recognition* **(CVPR'14)**, Columbus, Ohio, June 2014.

[C-8]. Nan Jiang and Ying Wu, "Unifying Spatial and Attribute Selection for Distracter-resilient Tracking", in *Proc. IEEE Conf. on Computer Vision and Pattern Recognition*(**CVPR'14)**, Columbus, Ohio, June 2014.

[C-9]. Jiang Wang and Ying Wu, "Learning Maximum Margin Temporal Warping for Action Recognition", in *Proc. IEEE Int'l Conf. on Computer Vision* **(ICCV'13)**, Sydney, Australia, Dec. 2013.

[C-10]. Zhuoyuan Chen and Ying Wu, "Robust Dictionary Learning by Error Source Decomposition", in *Proc. IEEE Int'l Conf. on Computer Vision* **(ICCV'13)**, Sydney, Australia, Dec. 2013.

[C-11]. Xiaohui Shen, Zhe Lin, Jon Brandt and Ying Wu, "Detecting and Aligning Faces by Image Retrieval", in *Proc. IEEE Conference on Computer Vision and Pattern Recognition* **(CVPR'13)**, Portland, OR, June 2013.

[C-12]. Zhuoyuan Chen, Hailin Jin, Zhe Lin, Scott Cohen and Ying Wu, "Large Displacement Optical Flow from Nearest Neighbor Fields", in *Proc. IEEE Conf. on Computer Vision and Pattern Recognition* **(CVPR'13)**, Portland, OR, June 2013.

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[C-134]. Ying Wu, Bin Li and Pingfan Yan, "Nonparametric Density Estimation Using Wavelet Transformation and Scale-space Zero-crossing Reconstruction", in *Proc. IEEE Int'l Conf. on Signal Processing* (**ICSP'96**), Vol.I, pp.319-322, Beijing, 1996.

[C-135]. Ying Wu and Bin Li, "Job-shop Scheduling Using Genetic Algorithms", in *Proc. IEEE Int'l Conf. on Signal Processing* (**ICSP'96**), Vol.II, pp.1441-1444, Beijing, 1996.

Selected Invited Lectures

[L-1]. "Learning from Failure", Tsinghua University, China, June 2017

[L-2]. "Learning from Failure", Huazhong University of Science and Technology, China, June 2017

[L-3]. "Making Intelligent Machines", ChangHong Inc., China, July 2016

[L-4]. "Learning Visual Simiarities", invited talk, Xi'an Jiaotong University, China, July 2016

[L-5]. "Learning Visual Similarities", invited talk, Nanyang Technological University, December 2015

[L-6]. "Learning Visual Similarities", invited talk, University of Trento, Italy, March 2015

[L-7]. "Learning Visual Similarities in Low-resolution Video", invited talk, Nanyang Technological University, December 2014

[L-8]. "Making Machines that Can See", invited talk, Nanyang Technological University, March 2012

[L-9]. "Persistent Visual Tracking", invited talk, Huazhong University of Science and Technology, December 2010

[L-10]. "Differential Motion Analysis", invited talk, Xi'an Jiaotong University, July 2010

[L-11]. "Motion from Blur", invited talk, National University of Singapore, July 2010

[L-12]. "Context-Awareness and Selective Attention", invited talk, Nanyang Technological University, July 2010

[L-13]. "Contextual Motion Analysis for Persistent Visual Tracking", invited talk, Kyoto University, June 2009

[L-14]. "Persistent Visual Tracking", invited talk, Chinese Academy of Science, April 2009

[L-15]. "Motion from Blur", invited talk, Chinese Academy of Science, March 2009

[L-16]. "Context-Awareness and Selective Attention for Persistent Visual Tracking", invited talk, Peking University, April 2009

[L-17]. "Towards Conquering Imperfectness in Images", invited talk, Microsoft Research Asia Lab, April 2009

[L-18]. "Context-awareness and Selective Attention for Persistent Visual Tracking", invited talk, University of Illinois at Urbana-Champaign, Oct. 2008.

[L-19]. "Context-Awareness, Selective Attention, and Blur in Motion Analysis", invited talk, University of Central Florida, March 2008.

[L-20]. "Visual Motion Analysis for *Machines that Can See*", invited talk, Mornings@McCormick Series, Northwestern University, March 2007.

[L-21]. "Visual Motion Analysis", invited short course, Lotus Hill Institute for Computer Vision and Information Science, Erzhou, China, July 2006.

[L-22]. "Computer Vision and Machine Learning for Video Surveillance/Security and Intelligent Human Computer Interactions", invited talk, Honeywell Aerospace Labs, Honeywell Automation and Control Solutions Lab, Minneapolis, MN, March 2006.

[L-23]. "Multiple Collaborative Kernel Tracking: Theory and Algorithms", invited talk, University of Illinois at Urbana-Champaign, Urbana, IL, March 2006.

[L-24]. "Multiple Collaborative Kernel Tracking", invited talk, University of Illinois at Chicago, Chicago, IL, Feb. 2006.

[L-25]. "Computer Vision Research at Northwestern University", invited talk, Motorola Intelligent Imaging Workshop, Motorola Corp., June 2005.

[L-26]. "Video-based Capturing of Human Motion for Intelligent Human Computer Interaction", invited talk, in *11th Int'l Conf. on Human-Computer Interaction*, Las Vegas, NV, July 2005

[L-27]. "A Glimpse of Computer Vision Technology for Homeland Security", invited lecture, Northwestern University, Homeland Security Lecture Series, Evanston, IL, Nov. 2004

[L-28]. "Visual Analysis of High-Dimensional Motion", invited lecture, Department of Statistics, Univ. of California at Los Angeles, Feb. 2004.

[L-29]. "Computer Vision Research at Northwestern University: an Introduction", invited lecture, Department of Automation, Tsinghua University, Sept. 2003.

[L-30]. "Tracking Articulated Motion in Video", invited lecture, Microsoft Research-Asia, August 2003.

[L-31]. "Markov Networks: Theory and Applications", invited lecture, Department of Computer Science and Technology, Tsinghua University, August 2003.

[L-32]. "Visual Tracking Technology", invited lecture, NEC Labs America, July 2003.

Theses Supervised

[G-1]. Philip Lee (Ph.D. 2014), "*Towards Efficient and Accurate Image Matting*", Northwestern University, June 2014,
(current position: Senior Software Engineer, Google Inc., CA)

[G-2]. Jiang Wang (Ph.D. 2014), "*Video-based Human Action Recognition*", Northwestern University, June 2014,
(current position: Senior Researcher, Google Inc., CA)

[G-3]. Zhuoyuan Chen (Ph.D. 2014), "*Constructing Dense Correspondences Field in Image Sequences*", Northwestern University, June 2014,
(current position: Senior Researcher, Baidu Institute of Deep Learning, CA)

[G-4]. Xiaohui Shen (Ph.D. 2013), "*Towards Object-level Image Understanding: Detecting Objects of Interests from Images*", Northwestern University, June 2013,
(Current position: Senior Researcher, Adobe Research Labs, CA)

[G-5]. Jialue Fan (Ph.D. 2011), "*Robust Visual Tracking*", Northwestern University, Oct. 2011,
(Current position: Senior Software Engineer, Google Inc., CA)

[G-6]. Jiang Xu (Ph.D. 2011), "*Multimodal Fusion*", Northwestern University, June 2011,
(Current position: Software Engineer, Google Inc., CA)

[G-7]. Junsong Yuan (Ph.D. 2009), "*Image and Video Data Mining*", Northwestern University, June 2009,
(Current position: Nanyang Associate Professor, Nanyang Technological University, Singapore)

[G-8]. Shengyang Dai (Ph.D. 2009), "*Conquering Image Imperfectness by Priors*", Northwestern University, June 2009,
(Current position: Senior Software Engineer, Google Inc., CA)

[G-9]. Ming Yang (Ph.D. 2008), "*Robust and Persistent Visual Tracking*", Northwestern University, May 2008,
(Current position: Co-founder, Horiozon Robotics, China)

[G-10]. Gang Hua (Ph.D. 2006), "*Probabilistic Variational Methods for Vision based Complex Motion Analysis*", Northwestern University, May 2006
(Current position: Principal Researcher, Microsoft Research, Redmond, WA)

[G-11]. Ting Yu, (Ph.D. 2006), "*Multiple Motion Analysis for Intelligent Video Surveillance*", Northwestern University, May 2006
(Current position: Senior Software Engineer, Google Inc., CA)

[G-12]. Zhimin Fan (M.S. 2005), "*Collaborative Multiple Kernel Tracking: Theory and Algorithms*", Northwestern University, Dec. 2005
(Current position: Analyst, China Development Bank, Beijing)

[G-13]. John Y. Lin (Ph.D. 2004) with Thomas S. Huang, "*Visual Hand Tracking And Gesture Analysis*", Univ. of Illinois at Urbana-Champaign, Sept. 2004
(Current position: Senior Software Engineer, Google Inc., CA)

Current Graduate Students

[S-1]. Yin Xia (Ph.D. expected 2017)

[S-2]. Pei Yu (Ph.D. expected 2018)

[S-3]. Jiahuan Zhou (Ph.D. expected 2018)

[S-4]. Chen Jiang (Ph.D. expected 2018)

[S-5]. Wei Tang (Ph.D. expected 2019)

[S-6]. Huayi Zhan (Ph.D. expected 2020)

[S-7]. Xiangyun Zhao (Ph.D. expected 2021)

Graduate Thesis Committees Served on

[O-1]. Jeremy Watt, "Feature Learning: Novel Algorithms and Unifying Perspectives", Ph.D. thesis ((supervised by Prof. Aggelos K. Katsaggelos), Northwestern University, Sept. 2015.

[O-2]. Zhaofu Chen, "Multidimensional Signal Processing for Sparse and Low-Rank Problems", Ph.D. thesis ((supervised by Prof. Aggelos K. Katsaggelos), Northwestern University, May 2014.

[O-3]. Xin Xin, "Compact Descriptors for Visual Search", Ph.D. thesis ((supervised by Prof. Aggelos K. Katsaggelos), Northwestern University, May 2014.

[O-4]. Bruno Amizic, "Bayesian Blind Image Restoration", Ph.D. thesis (supervised by Prof. Aggelos K. Katsaggelos), Northwestern University, August 2013.

[O-5]. Zhaofu Chen, "Statistical Sparse Signal Processing with Applications in Networks and Multimedia", Ph.D. thesis (supervised by Prof. Aggelos K. Katsaggelos), Northwestern University, June 2013 (thesis proposal).

[O-6]. Xin Xin, "Compact Image Descriptors and Visual Search", Ph.D. thesis (supervised by Prof. Aggelos K. Katsaggelos), Northwestern University, June 2013 (thesis proposal).

[O-7]. Lulu He, "Perceptual Color/texture Image Segmentation", Ph.D. thesis (supervised by Prof. Thrasos Pappas), Northwestern University, July 2012.

[O-8]. Jana Zujovic, "Perceptual Texture Similarity Metrics", Ph.D. thesis (supervised by Prof. Thrasos Pappas), Northwestern University, June 2011.

[O-9]. Louis Terry, "Audio-Visual Asynchrony Modeling and Analysis for Speech Alignment and Recognition", Ph.D. thesis (supervised by Prof. A. K. Katsaggelos), Northwestern University, March 2011.

[O-10]. Lulu He, "An Adaptive Clustering and Chrominance-Based Merging Approach for Image Segmentation and Abstraction", M.S. thesis (supervised by Prof. Thrasos Pappas), Northwestern University, May 2010.

[O-11]. Fan Jiang, "Anomalous Event Detection From Surveillance Video", Ph.D. thesis (supervised by Prof. A. K. Katsaggelos), Northwestern University, November 2010.

[O-12]. Derin Babacan, "Bayesian Techniques for Image Recovery", Ph.D. thesis (supervised by Prof. A. K. Katsaggelos), Northwestern University, June 2010.

[O-13]. Jana Zujovic, "Structure Similarity Metrics for Texture Analysis and Retrieval", M.S. thesis (supervised by Professor Thrasos Pappas), Northwestern University, Dec. 2008.

[O-14]. Ankit Mohan, "Image-based Rendering", Ph.D. thesis (supervised by Professor J. Tumblin), Northwestern University, April 2008.

[O-15]. Louis Terry, "Ergodic Hidden Markov Models for Visual-Only Isolated Digit Recognition", M.S. thesis (supervised by Professor A. K. Katsaggelos), Northwestern University, May, 2007

[O-16]. Derek Shiell, "Application of Active Appearance Models to Visual Digit Recognition and Visual Biometrics", M.S. thesis (supervised by Professor A. K. Katsaggelos), Northwestern University, May, 2007

[O-17]. Dejan Depalov, "Perceptually-Based Approaches for Image Classification and Retrieval", Ph.D. thesis (supervised by Professor T. Pappas), Northwestern University, Jan. 2007.

[O-18]. Derin Babacan, ""Spatiotemporal Algorithm for Joint Video Segmentation and Foreground Detection", M.S. thesis (supervised by Professor T. Pappas), Northwestern University, May, 2006

[O-19]. Eren Soyak, "Video Decoding", M.S. thesis (supervised by Professor A. K. Katsaggelos), Northwestern University, May 2006

[O-20]. Roger Biffiger, "Audio-Visual Automatic Isolated Digits Recognition", M.S. thesis (supervised by Professor A. K. Katsaggelos), Northwestern University, Jun. 2005

[O-21]. Junqing Chen, "Perceptual Metrics and Perceptual Coders", Ph.D. thesis (supervised by Professor T. Pappas), Northwestern University, Nov. 2003.

[O-22]. Zhilin Wu, "Multimodal Signal Processing with MPEG-4 Facial Animation Parameters", Ph.D. thesis (supervised by Professor A. K. Katsaggelos), Northwestern University, 2004.

[O-23]. Petar Aleksic, "Audio Visual Speech Recognition Using MPEG-4 Compliant Visual Features", Ph.D. thesis (supervised by Professor A. K. Katsaggelos), Northwestern University, 2004.

[O-24]. Zhu Li, "Video Summarization", Ph.D. thesis (supervised by Professor A. Katsaggelos), Northwestern University, 2004.

[O-25]. Feidu Luo, "Background Subtraction Techniques", M.S. thesis (supervised by Professor T. Pappas), Northwestern University, June 203.

[O-26]. Dejan Depalov, "Robust Fundamental Matrix Estimation for Collaborative Tracking of Multiple Targets Using Video Sensors", M.S. thesis (supervised by Professor T. Pappas), Northwestern University, June 2003.

Northwestern University Committees and Service

- EECS Strategic Planing Committee, 2009–present
- EECS Graduate Committee, 2007–present
- EECS Electrical Engineering Undergraduate Curriculum Committee, 2006–present
- EECS Distinguished Seminar Committee, 2004–present
- ECE Computing Committee, 2001–2005
- Co-organizer, EECS Math and Algorithms Discussion (MAD) group