

# John Wright

Department of Electrical Engineering, Columbia University

*Curriculum Vitae prepared May, 2019.*

## RESEARCH INTERESTS

HIGH-DIMENSIONAL SIGNAL PROCESSING  
ROBUST ESTIMATION AND LEARNING  
OPTIMIZATION  
COMPUTER VISION

## ADMINISTRATIVE

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## EDUCATION

Ph.D. in Electrical Engineering 2009  
University of Illinois at Urbana-Champaign  
Thesis title: *Error Correction for High-Dimensional Data via Convex Optimization*  
Thesis advisor: Prof. Yi Ma

M.S. in Electrical Engineering 2007  
University of Illinois at Urbana-Champaign  
Thesis title: *Segmentation of Multivariate Mixed Data via Lossy Coding and Compression*  
Thesis advisor: Prof. Yi Ma

B.S. in Computer Engineering 2004  
University of Illinois at Urbana-Champaign

## POSITIONS

Associate Professor 2016-present  
Columbia University New York, NY

Assistant Professor July 2011- 2016  
Columbia University New York, NY

Researcher May 2009-July 2011  
Visual Computing Group Microsoft Research, Beijing, China

## AWARDS AND HONORS

- **PAMI TC Young Researcher Award, 2015.** One awarded per year. Recognizes early career research contributions in computer vision and related areas.
- **Outstanding Reviewer Award.** CVPR 2016, ECCV 2016, CVPR 2014, ICCV 2013, CVPR 2013, CVPR 2011
- **Best Student Paper Award, SPARS 2015** for PhD Advisees Ju Sun and Qing Qu
- **Second Prize, Information and Inference Best Paper Competition, 2015** with Arvind Ganesh, Kerui Min and Yi Ma
- **Best Paper Award, Conference on Learning Theory, 2012,** with Huan Wang and Dan Spielman.

- **Martin Award for Outstanding Graduate Research**, University of Illinois at Urbana-Champaign, 2009. Awarded to one graduate student per year in the UIUC College of Engineering, to recognize the most outstanding research in the college.
- **Lemelson-Illinois Student Prize**, University of Illinois at Urbana-Champaign, 2009. \$30,000 prize awarded to one UIUC student per year, in recognition of innovation and inventiveness.
- **Microsoft Research Fellowship**, 2008-2010. National fellowship recognizing top graduate students in Computer Science, Electrical Engineering and Mathematics. One 16 awarded nationwide.
- **ECE Distinguished Fellowship**, University of Illinois at Urbana-Champaign, 2005-2006. Supports incoming graduate students with outstanding research potential.
- **Carver Fellowship**, 2005.
- **Bronze Tablet Award**, University of Illinois at Urbana-Champaign, 2004.

## PUBLICATIONS

Citation statistics from Google Scholar (2019). **Total citations: 27,815. h-Index: 39.**

### BOOK (IN PREPARATION)

**John Wright**, Yi Ma, "High-Dimensional Data Analysis with Sparse and Low-Dimensional Models: Theory, Algorithms and Applications." *Cambridge University Press*, 2020.

### JOURNAL

Han-Wen Kuo, Yuqian Zhang, Yenson Lau, **John Wright**, "Geometry and Symmetry in Short-and-Sparse Deconvolution", *submitted to SIAM Journal on the Mathematics of Data Science*, 2019

Qing Qu, Yuqian Zhang, Yonina Eldar, **John Wright**, "Convolutional Phase Retrieval via Gradient Descent", *submitted to IEEE Transactions on Information Theory*, 2019

Yuqian Zhang, Yenson Lau, Sky Cheung, Han-Wen, Kuo, **John Wright**, "On the Global Gometry of Sphere-Constrained Sparse Blind Deconvolution", *submitted to IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2019

Anna Dorfi, Han-Wen Kuo, Vera Smirnova, **John Wright**, Daniel Esposito, "Design and Operation of a Scanning Electrochemical Microscope for Imaging with Continuous Line Probes, *submitted to Review of Scientific Instruments*, 2019

Joel Esposito and **John Wright**, "Matrix Completion as a Post-Processing Technique for Probabilistic Roadmaps", *International Journal of Robotics Research*, 2019

Matt Bajor, Tanbir Haque, Guoxiang Han, Ciyuan Zhang, **John Wright**, Peter Kinget, A Flexible Phased-Array Architecture for Reception and Rapid Direction-of-Arrival Finding Utilizing Pesudo-Random Antenna Weight Modulation and Compressive Sensing, *IEEE Journal of Solid State Circuits*, 2019

Rabia Yazicigil, Tanbir Haque, Peter Kinget, **John Wright**, Taking Compressive Sensing to the Hardware Level: Breaking Fundamental Radio-Frequency Hardware Performance Tradeoffs, *IEEE Signal Processing Magazine*, 2019

Rabia Yazicigil, Tanbir Haque, Manoj Kumar, Jeffrey Yuan, **John Wright**, Peter Kinget, How to make analog-to-information converters work in dynamic spectrum environments with changing

sparsity conditions, *IEEE Transactions on Circuits and Systems I*, 2018

Yuqian Zhang, Han-Wen Kuo, **John Wright**, "Structured Local Optima in Sparse Blind Deconvolution", *submitted to IEEE Transactions on Information Theory*, 2018

Sky Cheung, John Shin, Yenson Lau, Ju Sun, Zhengyu Chen, Yuqian Zhang, **John Wright**, Abhay Pasupathy, "Beyond the Fourier Transform: A Dictionary Learning Approach to Microscopy Analysis", *submitted to Nature Physics*, 2018

Glen O'Neil, Han-Wen Kuo, Duncan Lomax, **John Wright** and Daniel Esposito, *Scanning Electrochemical Microscopy: Beyond the Point Probe*, Analytical Chemistry, 2018

Donald Goldfarb, Cun Mu, **John Wright**, Chaoxu Zhou, "Using Negative Curvature in Solving Nonlinear Programs", *submitted to Computational Optimization and Applications (COAP)*, 2017

Ju Sun, Qing Qu, **John Wright**, "A Geometric Analysis of Phase Retrieval", *Foundations of Computational Mathematics*, 2018

Ju Sun, Qing Qu, **John Wright**, "Complete Dictionary Recovery over the Sphere I: Overview and Geometric Picture", *IEEE Transactions on Information Theory*, 2017 [**Best Student Paper Award – Sun and Qu, SPARS 2015**]

Ju Sun, Qing Qu, **John Wright**, "Complete Dictionary Recovery over the Sphere II: Recovery by Riemannian Trust Region Method", *IEEE Transactions on Information Theory*, 2017

Qing Qu, Ju Sun, **John Wright**, "Finding a Sparse Vector in a Subspace: Linear Sparsity using Alternating Directions", *IEEE Transactions on Information Theory*, 2016

Cun Mu, Bo Huang, **John Wright**, and Donald Goldfarb, "Scalable Robust Matrix Recovery: Frank-Wolfe meets Proximal Algorithms", *SIAM Journal on Scientific Computing*, 2016

Bo Huang, Cun Mu, Donald Goldfarb and **John Wright**, "Provable Models for Robust Low-Rank Tensor Recovery", *Pacific Journal of Optimization*, 2015.

Rabia Tugce Yazicigil, Tanbir Haque, Michael Whalen, Jeffery Yuan, **John Wright**, Peter Kinget, "A 2.7-3.7 GHz Rapid Interferer Detector Exploiting Compressed Sampling with a Quadrature Analog-to-Information Converter", *Journal of Solid-State Circuits*, 2015.

Tanbir Haque, Rabia Tugce Yazicigil, Kyle Pan, **John Wright** and Peter Kinget, "Analysis and Design of a Quadrature Analog-to-Information Converter for Energy Efficient Wideband Spectrum Sensing", *IEEE Transactions on Circuits and Systems (TCAS) - I*, 2014.

Ju Sun, Yuqian Zhang and **John Wright**, "Efficient Point-to-Subspace Query with Application to Robust Face Recognition", *SIAM Journal on Imaging Science*, 2014.

**John Wright**, Arvind Ganesh, Kerui Min and Yi Ma, "Compressive Principal Component Pursuit", *Information and Inference*, 2013. [**Second Prize, I&I Best Paper Competition**].

Yigang Peng, Arvind Ganesh, **John Wright**, Wenli Xu and Yi Ma, "RASL: Robust Alignment via Sparse and Low-rank Decompositions for Linearly Correlated Images." *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2013. [**796 citations**].

Andrew Wagner, **John Wright**, Arvind Ganesh, Zihan Zhou, Hossein Mobahi and Yi Ma, "Toward a Practical Automatic Face Recognition System: Robust Alignment and Illumination via Sparse

Representation." *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2012. [766 citations].

Emmanuel Candès, Xiaodong Li, Yi Ma and **John Wright**, "Robust Principal Component Analysis?" *Journal of the ACM*, May 2011. [3,498 citations].

Jianchao Yang, **John Wright**, Thomas Huang and Yi Ma. "Image Super-Resolution via Sparse Representation." *IEEE Transactions on Image Processing*, November 2010. [3,456 citations].

**John Wright**, Yi Ma, Julien Mairal, Guillermo Sapiro, Thomas Huang, Shuicheng Yan. "Sparse Representation for Computer Vision and Pattern Recognition." *Proceedings of the IEEE*, June 2010. [1,473 citations].

**John Wright** and Yi Ma. "Dense Error Correction via  $\ell^1$ -Minimization." *IEEE Transactions on Information Theory*, July 2010. [273 citations].

**John Wright**, Yangyu Tao, Zhouchen Lin, Yi Ma and Heung-Yeung Shum. "Classification via Minimum Incremental Coding Length (MICL)," *SIAM Journal on Imaging Science*, February 2009.

**John Wright**, Allen Yang, Arvind Ganesh, Shankar Sastry and Yi Ma. "Robust Face Recognition via Sparse Representation," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, February 2009. [7,869 citations]. [CVPR 2014 Special Session on High-Impact Journal Papers].

Allen Yang, **John Wright**, Shankar Sastry and Yi Ma. "Unsupervised Segmentation of Natural Images via Lossy Data Compression," *Computer Vision and Image Understanding*, September 2008. [450 citations].

Yi Ma, Harm Derksen, Wei Hong and **John Wright**. "Segmentation of Multivariate Mixed Data via Lossy Coding and Compression," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, September 2007. [366 citations].

Wei Hong, **John Wright**, Kun Huang and Yi Ma. "A Multi-scale Hybrid Linear Model for Lossy Image Representation," *IEEE Transactions on Image Processing*, November 2006.

## CONFERENCE

Han-Wen Kuo, Yuqian Zhang, Yenson Lau, **John Wright**, "Geometry and Symmetry in Short-and-Sparse Deconvolution", *International Conference on Machine Learning*, 2019

Dar Gilboa, Sam Buchanan, **John Wright**, "Efficient Dictionary Learning with Gradient Descent", *International Conference on Machine Learning*, 2019

Sam Buchanan, Tanbir Haque, Peter Kinget and **John Wright**, "Efficient Model-Free Learning to Overcome Hardware Nonidealities in Analog-to-Information Converters", *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2018

Matt Bajor, Tanbir Haque, Guoxiang Han, Ciyuan Zhang, **John Wright**, Peter Kinget, "An 8-Element, 1-3 GHz Direct Space-to-Information Converter for Rapid Compressive Sampling Direction of Arrival Finding Utilizing Pseudo-Random Antenna-Weight Modulation", *IEEE Radio Frequency Integrated Circuits (RFIC)*, 2018

Yuqian Zhang, Han-Wen Kuo, **John Wright**, "Structured Local Optima in Sparse Blind Deconvolution," *Neural Information Processing Systems (NeurIPS)*, 2018

Sam Buchanan, Tanbir Haque, Peter Kinget, **John Wright**, "Efficient Model-Free Learning to Over-

come Hardware Nonidealities in Analog-to-Information Converters," *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2018

Matthew Bajor, Tanbir Haque, Guoxiang Han, Ciyuan Zhang, **John Wright**, Peter Kinget, "An 8-Element 1-3 GHz Direct Space-to-Information Converter for Rapid, Compressive Sampling Direction-of-Arrival Finding Utilizing Pseudo-Random Antenna-Weight Modulation," *IEEE Radio Frequency Integrated Circuits Symposium (RFIC)*, 2018 **[Finalist for Best Student Paper Award]**

Yuqian Zhang, Han-Wen Kuo, **John Wright**, "Structured Local Optima in Sparse Blind Deconvolution", *Neural Information Processing Systems (NeurIPS) Workshop on Nonconvex Optimization*, 2017

Qing Qu, Yuqian Zhang, Yonina Eldar, **John Wright**, "Convolutional Phase Retrieval," *Neural Information Processing Systems (NeurIPS)*, 2017

Yuqian Zhang, Han-Wen Kuo, Yenson Lau, Sky Cheung, Abhay Pasupathy, **John Wright**, "On the Global Geometry of Sphere-Constrained Sparse Blind Deconvolution", *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2017

Tanbir Haque, Mathew Bajor, Jianxun Zhu, Yudong Zhang, Zarion Jacobs, Robert Kettlewell, **John Wright**, Peter Kinget, "A Direct RF-to-Information Converter for Reception and Wideband Interferer Detection Employing Pseudo-Random LO Modulation," *IEEE Radio Frequency Integrated Circuits Symposium (RFIC)*, 2017

Qing Qu, Yuqian Zhang, Yonina Eldar, **John Wright**, "Convolutional Phase Retrieval via Gradient Descent", *Signal Processing with Adaptive Sparse Representations (SPARS)*, 2017

Joel Esposito and **John Wright**, "Matrix Completion as a Post-Processing Technique for Probabilistic Roadmaps", *Workshop on Algorithmic Foundations of Robotics (WAFR)*, 2016

Ju Sun, Qing Qu and **John Wright**, "A Geometric Analysis of Phase Retrieval", *International Symposium on Information Theory (ISIT)*, 2016

Rabia Tugce Yazicigil, Tanbir Haque, Manoj Kumar, Jeffrey Yuan, **John Wright**, and Peter Kinget, "A compressed-sampling time-segmented quadrature analog-to-information converter for wideband rapid detection of up to 6 interferers with adaptive thresholding," *IEEE Radio Frequency Integrated Circuits Symposium (RFIC)*, 2016.

Ju Sun, Qing Qu and **John Wright**, "When are Nonconvex Optimization Problems Not Scary", *NeurIPS Workshop on Nonconvex Optimization for Machine Learning*, 2015.

Ju Sun, Qing Qu and **John Wright**, "Complete Dictionary Recovery using Nonconvex Optimization", *International Conference on Machine Learning (ICML)*, 2015.

Rabia Tugce Yazicigil, Tanbir Haque, Michael Whalen, Jeffery Yuan, **John Wright**, Peter Kinget, "A 2.7-3.7 GHz Rapid Interferer Detector Exploiting Compressed Sampling with a Quadrature Analog-to-Information Converter", *International Conference on Solid State Circuits (ISSCC)*, 2015.

Qing Qu, Ju Sun and **John Wright**, "Finding a Sparse Vector in a Subspace: Linear Sparsity using Alternating Directions", *Neural Information Processing Systems (NeurIPS)*, 2014.

Cun Mu, Bo Huang, Donald Goldfarb and **John Wright**, "Square Deal: Lower Bounds and Improved Relaxations for Tensor Recovery." *International Conference on Machine Learning (ICML)*, 2014.

Quan Geng and **John Wright**, "On the Local Correctness of  $\ell^1$  Minimization for Dictionary Learn-

ing." *International Symposium on Information Theory (ISIT)*, 2014.

Yuqian Zhang, Cun Mu, Han-Wen Kuo and **John Wright**, "Towards Guaranteed Illumination Models for Non-convex Objects." *International Conference on Computer Vision (ICCV)*, 2013.

Xu Wang, Stefan Atev, **John Wright** and Gilad Lerman, "Fast Subspace Search via Grassmannian Based Hashing." *International Conference on Computer Vision (ICCV)*, 2013.

Xiao-Ming Wu, Zhenguo Li, **John Wright**, Anthony Man-Chu So, and Shih-Fu Chang. "Learning with Partially-Absorbing Random Walks." *Neural Information Processing Systems (NeurIPS)*, 2012.

Ju Sun, Yuqian Zhang and **John Wright**. "Efficient Point-To-Subspace Query in  $\ell^1$  with Application to Robust Face Recognition", *European Conference on Computer Vision (ECCV)*, 2012.

Yadong Mu, **John Wright**, and Shih-Fu Chang. "Accelerated Large-Scale Optimization with Concomitant Hashing", *European Conference on Computer Vision (ECCV)*, 2012.

**John Wright**, Arvind Ganesh, Kerui Min and Yi Ma. "Compressive Principal Component Pursuit", *International Symposium on Information Theory (ISIT)*, 2012.

Arvind Ganesh, Kerui Min, **John Wright** and Yi Ma. "Principal Component Pursuit with Reduced Linear Measurements", *International Symposium on Information Theory (ISIT)*, 2012.

Dan Spielman, Huan Wang, and **John Wright**. "Exact Recovery of Sparsely-Used Dictionaries", *Conference on Learning Theory (COLT)*, 2012. **[Best paper award]**.

Rei Kawakami, **John Wright**, Yu-Wing Tai, Yasuyuki Matsushita, Moshe Ben-Ezra and Katsu Ikiuchi. "High Resolution Hyperspectral Imaging via Matrix Factorization," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2011.

Kerui Min, Zhengdong Zhang, **John Wright** and Yi Ma. "Decomposing Background Topics from Keywords by Principal Component Pursuit," *ACM Conference on Information and Knowledge Mining (CIKM)*, 2010.

Zihan Zhou, Xiaodong Li, **John Wright**, Emmanuel Candès and Yi Ma. "Stable Principal Component Pursuit," *International Symposium on Information Theory (ISIT)*, 2010.

Arvind Ganesh, **John Wright**, Xiaodong Li, Emmanuel Candès and Yi Ma. "Dense Error Correction for Low-Rank Matrices via Principal Component Pursuit," *International Symposium on Information Theory (ISIT)*, 2010.

Kerui Min, Linjun Yang, **John Wright**, Lei Wu, Xian-Sheng Hua and Yi Ma. "Compact Projection: Simple and Efficient Near Neighbor Search with Practical Memory Requirements" *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2010.

Yigang Peng, Arvind Ganesh, **John Wright**, and Yi Ma. "RASL: Robust Alignment by Sparse and Low-rank Decomposition for Linearly Correlated Images." *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2010.

Zhi Li, Feng Wu, and **John Wright**. "On the Systematic Measurement Matrix for Compressed Sensing in the Presence of Gross Errors." *Data Compression Conference (DCC)*, 2010.

Zhouchen Lin, Arvind Ganesh, **John Wright**, Leqin Wu, Minming Chen and Yi Ma. "Fast Convex Optimization Algorithms for Exact Recovery of a Corrupted Low-Rank Matrix." *Computational*

*Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, December 2009.

**John Wright** and Gang Hua. "Implicit Elastic Matching with Random Projections for Pose-Variant Face Recognition," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2009.

Andrew Wagner, **John Wright**, Arvind Ganesh, Zihan Zhou and Yi Ma. "Toward a Practical Automatic Face Recognition System: Robust Registration and Illumination by Sparse Representation." *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2009.

Yoav Sharon, **John Wright** and Yi Ma. "Minimum Sum of Distances Estimator: Robustness and Stability," *American Control Conference (ACC)*, June 2009.

**John Wright** and Yi Ma. "Dense Error Correction via  $\ell^1$ -minimization," *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, April 2009.

Zihan Zhou, Arvind Ganesh, **John Wright**, Shen-Fu Tsai, and Yi Ma. "Nearest Subspace Patch Matching for Face Recognition Under Varying Pose and Illumination," *IEEE Conference on Face and Gesture Recognition (FGR)*, September 2008.

Jianchao Yang, **John Wright**, Thomas Huang and Yi Ma. "Image Super-resolution as Sparse Representation of Raw Patches." *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2008. [791 citations].

**John Wright**, Yangyu Tao, Zhouchen Lin, Yi Ma and Heung-Yeung Shum. "Classification via Minimum Incremental Coding Length (MICL)," *Neural Information Processing Systems (NeurIPS)*, December 2007.

**John Wright**, Wei Hong, Yi Ma, and Harm Derksen. "Segmentation of Multivariate Mixed Data via Lossy Coding and Compression," In *SPIE conference on Visual Communication and Image Processing (VCIP)*, January 2007.

**John Wright**, Andrew Wagner, Shankar Rao, and Yi Ma. "Homography from Coplanar Ellipses with Application to Forensic Blood Splatter Reconstruction," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2006.

Wei Hong, **John Wright**, Kun Huang, and Yi Ma. "A Multi-scale Hybrid Linear Model for Lossy Image Representation," *IEEE International Conference on Computer Vision (ICCV)*, October 2005.

**John Wright** and Robert Pless. "Analysis of Persistent Motion using the 3d Structure Tensor," *IEEE Workshop on Motion and Video Computing*, January 2005.

Richard Souvenir, **John Wright** and Robert Pless. "Spatiotemporal Detection and Isolation: Results on PETS 2005 Datasets," *IEEE Workshop on Performance Evaluation of Tracking and Surveillance*, 2005.

## OTHER REPORTS

Cun Mu, Bo Huang, **John Wright** and Donald Goldfarb, "Square Deal: Lower Bounds and Improved Relaxations for Low-rank Tensor Recovery", 2015

Yuqian Zhang, Cun Mu, Han-Wen Kuo and **John Wright**, "Towards Guaranteed Illumination Models for Non-Convex Objects", 2014.

## TEACHING

**ELEN 6886 Spring 2019: Sparse Representation and High-Dimensional Geometry.**  
Enrollment: 29 students

**ELEN 6886 Spring 2018: Sparse Representation and High-Dimensional Geometry.**  
Enrollment: 48 students  
Overall instructor quality: 4.39 / 5.00  
Overall course quality: 4.28 / 5.00

**ELEN 4810 Fall 2017: Digital Signal Processing.**  
*Core course in signal processing, serving both undergraduates and MS students*  
Enrollment: 68 students  
Overall instructor quality: 4.71 / 5.00 (94.2%)  
Overall course quality: 4.46 / 5.00 (89.2%)

**ELEN 6886 Spring 2017: Sparse Representation and High-Dimensional Geometry.**  
Enrollment: 32 students  
Overall instructor quality: 4.87 / 5.00 (97.4%)  
Overall course quality: 4.83 / 5.00 (96.6%)

**ELEN 4810 Fall 2016: Digital Signal Processing.**  
*Core course in signal processing, serving both undergraduates and MS students*  
Enrollment: 82 students  
Overall instructor quality: 4.81 / 5.00 (96.2%)  
Overall course quality: 4.61 / 5.00 (92.2%)

**ELEN 4810 Fall 2015: Digital Signal Processing.**  
*Core course in signal processing, serving both undergraduates and MS students*  
Enrollment: 82 students  
Overall instructor quality: 4.59 / 5.00 (92%)  
Overall course quality: 4.52 / 5.00 (90%)

**ELEN 6886 Fall 2015: Sparse Representation and High-Dimensional Geometry.**  
*Graduate special topics course on sparse and low-rank recovery and their applications.*  
Enrollment: 42 students  
Overall instructor quality: 4.60 / 5.00 (92%)  
Overall course quality: 4.37 / 5.00 (87%)

**ELEN 4810 Fall 2014: Digital Signal Processing.**  
*Core course in signal processing, serving both undergraduates and MS students*  
Enrollment: 99 Students  
Overall instructor quality: 4.55 / 5.00 (91%)  
Overall course quality: 4.38 / 5.00 (87.6%)

**ELEN 6886 Spring 2014: Sparse Representation and High-Dimensional Geometry.**  
*Graduate special topics course on sparse and low-rank recovery and their applications.*  
Enrollment: 11 students  
Overall instructor quality: 5.00 / 5.00 (100%)  
Overall course quality: 4.67 / 5.00 (93.4%)

**ELEN 4835 Spring 2013: Introduction to Adaptive Signal Representations.**  
*MS level course on optimization and machine learning for signal processing.*  
Enrollment: 10 students  
Overall instructor quality: 4.67 / 5.00 (93.4%)  
Overall course quality: 4.67 / 5.00 (93.4%)



**ELEN 6886 Fall 2012: Sparse Representation and High-Dimensional Geometry.**

*Graduate special topics course on sparse and low-rank recovery and their applications.* Enrollment: 19 students

Overall instructor quality: 4.20 / 5.00 (84.0%)

Overall course quality: 4.20 / 5.00 (84.0%)

**ELEN 4835 Spring 2012: Introduction to Adaptive Signal Representations.**

*Introduced a BS/MS level course on optimization and machine learning for signal processing.* Enrollment: 13 students

Overall instructor quality: 4.45 / 5.00 (89.0%)

Overall course quality: 4.45 / 5.00 (89.0%)

**ELEN 6886 Fall 2011: Sparse Representation and High-Dimensional Geometry.**

*Introduced new graduate special topics course on sparse and low-rank recovery and their applications.* Enrollment: 17 students

Overall instructor quality: 4.56 / 4.56 (91.2%)

Overall course quality: 4.56 / 4.56 (91.2%)

**Tutorial: Sparse Representation and Its Applications in High-Dimensional Pattern Recognition**

*Computer Vision and Pattern Recognition (CVPR), 2009*

**Tutorial: Low-Rank Matrix Recovery for Image and Video Processing**

*International Conference on Image Processing (ICIP), 2010*

**Tutorial: Low-Rank Matrix Recovery: from Theory to Imaging Applications**

*International Conference on Imaging and Graphics (ICIG), 2011*

**Tutorial: Sparse and Low-Rank Representation for Biometrics**

*International Joint Conference on Biometrics (IJCB), 2011*

**Tutorial: Sparse and Low-Rank Representation for Computer Vision: Theory, Algorithms and Applications**

*European Conference on Computer Vision (ECCV), 2012*

**Short Course: Sparse and Low-Rank Representation for Computer Vision: Theory, Algorithms and Applications**

*Institute for Pure and Applied Mathematics, UCLA, 2013*

**Tutorial: Sparse and Low-rank Methods for Computer Vision, ICCV, 2013**

**Tutorial: High Dimensional Data Analysis, CVPR 2015**

**Tutorial: Sparse and Low-rank Methods for Computer Vision, SDDS 2015**

**Tutorial: Nonconvex Optimization for Data Science, CU TRIPODS Bootcamp, 2018**

**Doctoral Students Supervised:**

- Ju Sun, PhD 2016, EE Department, Columbia University, now postdoctoral scholar at Stanford University
- Yuqian Zhang, PhD 2018, EE Department, Columbia University, now postdoctoral scholar at Cornell University
- Qing Qu, PhD 2018, EE Department, Columbia University, now a postdoctoral scholar at New York University

- Henry Kuo, PhD Student, EE Department, Columbia University
- Yenson Lau, PhD Student, EE Department, Columbia University
- Robert Colgan, PhD Student, CS Department, Columbia University
- Sam Buchanan, *NDSEG Fellow, 2017-2020*, PhD Student, EE Department, Columbia University
- Dar Gilboa, PhD Student, Neurobiology Department, Columbia University
- Tim Wang, PhD Student, EE Department, Columbia University
- Jingkai Yan, *Wei Family Fellow*, PhD Student, EE Department, Columbia University
- Mariam Avagyan, PhD Student, EE Department, Columbia University

Co-supervised:

- Tugce Yazicigil, PhD 2016, EE Department, Columbia University (co-advised with Peter Kinget). Now a postdoctoral scholar at MIT
- Tanbir Haque, PhD Student, EE Department, Columbia University (co-advised with Peter Kinget).
- Cun Mu, PhD Student, IEOR Department, Columbia University (co-advised with Donald Goldfarb). Now with Jet.com.
- Bo Huang, PhD, IEOR Department, Columbia University (co-advised with Donald Goldfarb). Now at Arxis Capital

**Doctoral Committees:**

- Zheng Shou, PhD, Electrical Engineering, Columbia University  
*Deep Learning for Action Understanding in Video*
- San Gultekin, PhD, Electrical Engineering, Columbia University  
*Dynamic Machine Learning with Least Squares Objectives*
- Lama Affara, PhD, Computer Science, Kaust  
*Urban Image Analysis with Convolutional Sparse Coding*
- Qing Qu, PhD, Electrical Engineering, Columbia University  
*Nonconvex Recovery of Low-Complexity Models*
- Yuqian Zhang, PhD, Electrical Engineering, Columbia University  
*Low-Complexity Modeling for Visual Data: Representations and Algorithms*
- Jie Feng, PhD, Computer Science, Columbia University  
*3-D Object Understanding using RGB-D Data*
- Cun Mu, PhD, Industrial Engineering and Operations Research, Columbia University  
*Structured Tensor Recovery and Decomposition*
- Pitcha Prasitmeeboon, PhD, Electrical Engineering, Columbia University  
*Robustification and Optimization in Repetitive Control for Minimum Phase and Non-Minimum Phase Systems*
- Shang Li, PhD, Electrical Engineering, Columbia University  
*Cooperative Sequential Hypothesis Testing in Multi-Agent Systems*
- Zhuo Chen, PhD, Electrical Engineering, Columbia University  
*Single channel auditory source separation with neural network*
- Yu Gan, PhD, Electrical Engineering, Columbia University  
*Image analytic tools for tissue characterization using optical coherence tomography*
- Manolis Tsakiris, PhD Electrical and Computer Engineering, Johns Hopkins University  
*Advances in Algebraic Subspace Clustering and Dual Principal Component Pursuit*

- Mehdi Ashraphijuo, PhD, Electrical Engineering, Columbia University  
*Capacity Regions and Degrees of Freedom of Bidirectional Networks*
- Yu Chen, PhD, Electrical Engineering, Columbia University  
*Digital Signal Processing with Signal Derived Timing: Analysis and Implementation*
- Ju Sun, PhD, Electrical Engineering, Columbia University  
*When are nonconvex optimization problems not scary?*
- Abdulkadir Elmas, PhD, Electrical Engineering, Columbia University  
*Topics in Signal Processing: applications in genomics and genetics*
- Rabia Tugce Yazicigil, PhD, Electrical Engineering, Columbia University  
*Compressive Sampling as an Enabling Solution for Energy-Efficient and Rapid Wideband RF Spectrum Sensing in Emerging Cognitive Radio Systems*
- Colin Raffel, PhD, Electrical Engineering, Columbia University  
*Learning-Based Methods for Comparing Sequences, with Applications to Audio-to-MIDI Alignment and Matching*
- Xiaoming Wu, PhD, Electrical Engineering, Columbia University  
*Learning on Graphs with Partially Absorbing Random Walks: Theory and Practice*
- Hicham Badri, PhD, Electrical Engineering, INRIA Bordeaux  
*Mthodes parcimonieuses et invariantes d'chelle en traitement d'image*
- Ramtin Madani, PhD, Electrical Engineering, Columbia University  
*Computational Methods for Nonlinear Optimization Problems: Theory and Applications*
- Guangnan Ye, PhD, Electrical Engineering, Columbia University  
*Large-Scale Video Event Detection*
- Felix Yu, PhD, Electrical Engineering, Columbia University
- Anil Chinnan, PhD, Electrical Engineering, Columbia University  
*Simultaneous Iterative Learning and Feedback Control Design*
- Zhe Wang PhD, Electrical Engineering, Columbia University  
*Resource Allocation for Energy Harvesting Communications*
- Junfeng He, PhD, Electrical Engineering, Columbia University
- Bo Huang [PhD Co-advisee], IEOR, Columbia University  
*Convex Optimization Algorithms and Recovery Theories for Sparse Models in Machine Learning*
- Tony Qin, PhD, IEOR, Columbia University  
*Optimization Algorithms for Structured Machine Learning and Image Processing*
- Thierry Bertin-Mahieux, PhD, Electrical Engineering, Columbia University  
*Large-Scale Pattern Discovery in Music*
- Mandis Beigi, PhD, Electrical Engineering, Columbia University  
*On Optimal Quantization bandits Effect on Anomaly Detection and Image Classification*
- Ehsan Elhamifar, PhD, Electrical and Computer Engineering, John's Hopkins University  
*Sparse Modeling for High-Dimensional Multi-Manifold Data*
- Chen Gong, PhD, Electrical Engineering, Columbia University
- Guido Jajamovich, PhD, Electrical Engineering, Columbia University
- Huan Wang, PhD, Computer Science, Yale University
- Byung Suk Lee, PhD, Electrical Engineering, Columbia University

## PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers (IEEE).  
Association for Computing Machines (ACM).  
Society for Industrial and Applied Mathematics (SIAM).

## SERVICE

### Reviewer:

*IEEE Transactions on Pattern Analysis and Machine Intelligence*  
*IEEE Transactions on Signal Processing*  
*IEEE Transactions on Image Processing*  
*IEEE Transactions on Information Theory*  
*Applied and Computational Harmonic Analysis*  
*Annals of Statistics*  
*Journal of Computer Science and Technology (JCST)*  
*Proceedings of the IEEE, Special Issue on Sparse Representation and Compressed Sensing*  
*ACM Siggraph*  
*International Conference on Machine Learning (ICML)*  
*IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*  
*International Conference on Computer Vision (ICCV)*  
*European Conference on Computer Vision (ECCV)*  
*International Symposium on Information Theory (ISIT)*  
*IEEE Conference on Acoustics, Speech and Signal Processing (ICASSP)*  
*International Workshop on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMM-CVPR)*  
*Electronic Letters in Statistics (ELS)*  
*Signal Processing Letters*

### Guest Editor:

*Journal on Selected Topics in Signal Processing Special Issue on Structured Matrix Models, 2016.*

### Area Chair:

*Neural Information Processing Systems (NeurIPS), 2018*  
*Neural Information Processing Systems (NeurIPS), 2017*  
*International Conference on Computer Vision (ICCV), 2017*  
*Neural Information Processing Systems (NeurIPS), 2014*  
*International Conference on Computer Vision (ICCV), 2015*

### Short courses and tutorials organized:

CVPR 2009 short course: *Sparse Representation and Its Applications in High-Dimensional Pattern Recognition*  
ICIP 2010 short course: *Low-Rank Matrix Recovery for Image and Video Processing*  
ICIG 2011 short course: *Low-Rank Matrix Recovery: from Theory to Imaging Applications*  
IJCB 2011 short course: *Sparse and Low-Rank Representation for Biometrics*  
ECCV 2012 tutorial: *Sparse and Low-Rank Representation for Computer Vision: Theory, Algorithms and Applications*  
IPAM tutorial: *Sparse and Low-Rank Representation for Computer Vision: Theory, Algorithms and Applications*  
CVPR 2015 tutorial: *High-Dimensional Data Analysis*  
SDDS 2015 tutorial: *Sparse and Low-Rank Representation for Computer Vision: Theory, Algorithms and Applications*

### Workshops organized:

Analysis and Synthesis: Fraternal Twins in Sparse Modeling, NeurIPS 2013      Robust Subspace

Learning and Computer Vision, ICCV 2015

**Chair:** Center for Foundations of Data Science, Columbia University

**Co-organizer:** Seminar on Foundations of Data Science, Columbia University