

## CURRICULUM VITAE: NAMRATA VASWANI

### I. CANDIDATE INFORMATION

A. Name: Namrata Vaswani

B. Education

- Ph.D. (Electrical and Computer Engineering), 2004  
**University of Maryland, College Park, MD**
- B.Tech. (Electrical Engineering), 1999  
**Indian Institute of Technology (IIT), Delhi, India**

C. Academic Experience

- Professor, Dept. of Electrical and Computer Engineering  
Iowa State University, Ames, IA (July 2016 – present)
  - Courtesy Professor, Dept. of Mathematics,
    - Iowa State University, Ames, IA (August 2013 – present)
- Associate Professor, Dept. of Electrical and Computer Engineering  
Iowa State University, Ames, IA (August 2011 – June 2016)
  - Faculty Professional Development Leave (sabbatical) at
    - University of Illinois, Urbana-Champaign (UIUC), Spring 2015
- Assistant Professor, Dept. of Electrical and Computer Engineering  
Iowa State University, Ames, IA (August 2005 – July 2011)
- Research Areas:
  - Machine Learning and Data Science
    - Dynamic robust PCA / robust subspace tracking
    - Dynamic compressive sensing (CS) / recursive sparse recovery
    - Big-data analytics, video analytics, computer vision
  - Bio-Imaging: dynamic MRI, functional MRI (fMRI), optical coherence tomography

D. Other Professional Employment

- Research scientist & Postdoctoral fellow, School of Electrical and Computer Engineering  
**Georgia Institute of Technology, Atlanta, GA (August 2004 – July 2005)**
- Research Intern, Signal and Image Processing Division  
**HRL (formerly Hughes Research Labs), Malibu, CA (June – October 2001)**
- Graduate Research Assistant, Dept. of Electrical and Computer Engineering  
**Univ. of Maryland, College Park, MD (August 1999 – July 2004)**

E. Major Award

- **2014 IEEE Signal Processing Society (SPS) Best Paper Award** for  
“N. Vaswani and W. Lu\*, Modified-CS: Modifying Compressive Sensing for Problems with Partially Known Support, *IEEE Trans. Signal Processing*, vol. 58(9), pp. 4595-4607, Sep. 2010”.
  - The SPS Best Paper Award honors the author(s) of a paper of exceptional merit dealing with a subject related to the Society’s technical scope, and appearing in one of the Society’s solely owned transactions or the Journal of Selected Topics in Signal Processing, irrespective of the author’s age. Eligibility is based on a five-year window: for example, for the 2013 Award, the paper must have appeared in one of the Society’s Transactions between January 1, 2008 and December 31, 2012.

#### F. Other Awards, Honors and Major Professional Service

- Iowa State University Early Career Engineering Faculty Research Award, 2014.
- Senior Member of IEEE since 2014
- Harpole-Pentair Assistant Professor, Iowa State University, 2008-09
- Invited to give a department seminar in ECE dept. at Carnegie Mellon University (CMU), Feb. 2015
- Invited to give a department colloquium in the ECE dept. at UIUC, Dec. 2013
- Invited participant in year-long program on Sequential Monte Carlo at Statistical and Applied Mathematical Sciences Institute (SAMSI), 2008-09
- Invited workshop talks at SAMSI, Institute for Pure and Applied Mathematics (IPAM), and Institute of Mathematics and its Applications (IMA)
- ICASSP 2004 paper on *Bound on Errors in Particle Filtering with Incorrect Model Assumptions and its Implication for Change Detection* designated as an outstanding paper in the Signal Processing Theory & Methods category
- Nominated for Best B.Tech Project in Electrical Engineering at IIT-Delhi, India, 1999
- Summer Undergraduate Research Award (SURA) at IIT-Delhi, India, 1997

#### G. Major Professional Service

- **Associate Editor** of *IEEE Transactions on Signal Processing*  
March 2017 – present, and  
Oct 2009 – Feb 2013
- **Presented a Tutorial at ICASSP 2017**  
“Big Data Mining in Large but Structured Noise”
- **Elected Member of two Technical Committees (TC) of IEEE Signal Processing Society**  
- Signal Processing Theory and Methods (SPTM) TC, Jan 2016 – Dec 2018  
- Image, Video and Multidimensional Signal Processing (IVMSP) TC, Jan 2015 – Dec 2017
- **Chair-Elect of Women in Signal Processing committee**  
Jan 2017 – present
- **Symposium and Workshop Organization (as Co-Chair)**  
- Robust Subspace Learning and Applications in Computer Vision Workshop at ICCV 2017 (IEEE Intl. Conf. on Computer Vision), main organizer: Thierry Bouwmans  
- Robust Subspace Learning Workshop at ICCV 2015 (IEEE Intl. Conf. on Computer Vision), main organizer: Thierry Bouwmans  
- Big Data Analysis and Challenges in Medical Imaging at GlobalSIP 2016, main organizer: Anubha Gupta  
- Information Processing in Big Data Symposium at GlobalSIP 2014  
- Compressed Sensing and Matrix Completion Min-symposium at ILAS 2017 (Meeting of the International Linear Algebra Society) – in planning, joint with Simon Foucart
- **Tutorials’ Chair for ICIP 2008 and Area Chair for ICIP 2009 and 2016**

#### H. Citation Summary (taken from Google Scholar on April 19, 2017)

- **h-index: 29**
- **g-index: 49**
- **Total Citations: 2858**
- **Three Most Cited Papers**

1. N. Vaswani and W. Lu\*, "Modified-CS: Modifying Compressive Sensing for Problems with Partially Known Support," *IEEE Trans. Signal Processing*, vol. 58(9), pp. 4595-4607, Sep. 2010. *Cited 372 times.* [**2014 IEEE Signal Processing Society Best Paper Award**]
2. N. Vaswani, Kalman Filtered Compressed Sensing," in *Proc. IEEE Intl. Conf. Image Processing (ICIP)*, 2008. *Cited 257 times.*
3. Y. Rathi, N. Vaswani, A. Tannenbaum, A. Yezzi, "Tracking Deforming Objects using Particle Filtering for Geometric Active Contours," *IEEE Trans. Pattern Analysis and Machine Intelligence (PAMI)*, vol. 29(8), pp. 1470-1475, Aug. 2007. *Cited 206 times.*

## II. RESEARCH / CREATIVE ACTIVITIES

### A. Scholarship

\* *Denotes student co-author.*

# *Denotes any publication derived from the candidate's thesis/dissertation.*

#### 1. Articles in Peer-Reviewed Journals and Highly-Selective Conference Proceedings (citation information taken from Google Scholar on November 30, 2015)

1. **N. Vaswani**, S. Nayer\* and Y. Eldar, "Low Rank Phase Retrieval", to appear, *IEEE Transactions on Signal Processing*, 2017.
2. **N. Vaswani** and H. Guo\*, "Correlated-PCA: Principal Components' Analysis when Data and Noise are Correlated", *Proc. Neural Info. Proc. Systems (NIPS)*, 2016. **Acceptance rate: 22.7%**
3. J. Zhan\*, B. Lois\*, H. Guo\*, and **N. Vaswani**, "Online (and Offline) Robust PCA: Novel Algorithms and Correctness Results", *Proc. International Conf. Artificial Intelligence and Statistics (AISTATS)*, 2016. **Acceptance rate: 30.7%**
4. **N. Vaswani** and J. Zhan\*, "Recursive Recovery of Sparse Signal Sequences From Compressive Measurements: A Review", *IEEE Transactions on Signal Processing*, 64 (13), 3523-3549, 2016 (Old title: Recursive Dynamic CS: Recursive Recovery of Sparse Signal Sequences from Compressive Measurements: A Review)
5. K. Santra, J. Zhan\*, X. Song, E. Smith, **N. Vaswani** and J. Petrich, "What Is the Best Method to Fit Time-Resolved Data? A Comparison of the Residual Minimization and the Maximum Likelihood Techniques as Applied to Experimental Time-Correlated, Single-Photon Counting Data", *The Journal of Physical Chemistry*, B 120 (9), 2484-2490, 2016.
6. J. Zhan\* and **N. Vaswani**, "Robust PCA with Partial Subspace Knowledge", *IEEE Transactions on Signal Processing*, July, 2015.
7. J. Zhan\* and **N. Vaswani**, "Time Invariant Error Bounds for Modified-CS based Sparse Signal Sequence Recovery", *IEEE Trans. Information Theory*, March 2015 [*this or its conference versions cited 27 times*].
8. C. Qiu\*, **N. Vaswani**, B. Lois\* and L. Hogben, "Recursive Robust PCA or Recursive Sparse Recovery in Large but Structured Noise", *IEEE Trans. Information Theory*, August, 2014 [*this or its conference versions cited 33 times*].
9. H. Guo\*, C. Qiu\* and **N. Vaswani**, "An Online Algorithm for Separating Sparse and Low-dimensional Signal Sequences from their Sum", *IEEE Trans. Signal Processing*, vol. 62(16), pp 4284-4297, August 2014 [*this or its conference versions cited 70 times*].
10. D. Xu, **N. Vaswani**, Y. Huang and J. U. Kang, "Modified Compressive Sensing Optical Coherence Tomography with Noise Reduction", *Optics Letters*, vol. 37(20), 4209-4211, Oct 2012 [*cited 11 times*].

11. W. Lu\* and N. Vaswani, "Exact Reconstruction Conditions for Regularized Modified Basis Pursuit (reg-mod-BP)", *IEEE Trans. Signal Processing*, vol. 60 (5), pp. 2634-2640, May, 2012 [this or its conference version cited 26 times].
12. S. Das\*, A. Kale, and N. Vaswani, "Particle Filter with Mode Tracker (PF-MT) for Visual Tracking across Illumination Changes", *IEEE Trans. Image Processing*, vol. 21(4), pp. 2340-2346, April, 2012 [this or its conference version cited 31 times].
13. W. Lu\* and N. Vaswani, "Regularized Modified BPDN for Noisy Sparse Reconstruction with Partial Erroneous Support and Signal Value Knowledge", *IEEE Trans. Signal Processing*, vol. 60(1), pp. 182 – 196, Jan. 2012 [this or its conference versions cited 42 times].
14. N. Vaswani, "LS-CS-residual (LS-CS): Compressive Sensing on the Least Squares Residual," *IEEE Trans. Signal Processing*, vol. 58(8), pp. 4108-4120, Aug. 2010 [cited 82 times].
15. N. Vaswani and W. Lu\*, "Modified-CS: Modifying Compressive Sensing for Problems with Partially Known Support," *IEEE Trans. Signal Processing*, vol. 58(9), pp. 4595-4607, Sep. 2010 [2014 IEEE Signal Processing Society Best Paper Award] [cited 323 times].
16. S. Das\* and N. Vaswani, "Nonstationary Shape Activities: Dynamic Models for Landmark Shape Change and Applications," *IEEE Trans. Pattern Analysis and Machine Intelligence (PAMI)*, vol. 32(4), pp. 579-592, Apr. 2010 [this or its conference versions cited 26 times].
17. N. Vaswani, Y. Rathi, A. Yezzi, A. Tannenbaum, "Deform PF-MT: Particle Filter with Mode Tracker for Tracking Non-Affine Contour Deformations," *IEEE Trans. Image Processing*, vol. 19(4), pp. 841-857, Apr. 2010 [this or its conference versions cited 40 times].
18. N. Vaswani, "Particle Filtering Algorithms for Multimodal Observation Likelihoods and Large Dimensional State Spaces," *IEEE Trans. Signal Proc.*, vol. 56(10-1), pp. 4583-4597, Oct. 2008 [this or its conference versions cited 57 times].
19. Y. Rathi, N. Vaswani, A. Tannenbaum, A. Yezzi, "Tracking Deforming Objects using Particle Filtering for Geometric Active Contours," *IEEE Trans. Pattern Analysis and Machine Intelligence (PAMI)*, vol. 29(8), pp. 1470-1475, Aug. 2007 [cited 171 times].
20. Y. Rathi, N. Vaswani, A. Tannenbaum, "A Generic Framework for Tracking using Particle Filter with Dynamic Shape Prior," *IEEE Trans. Image Processing*, vol. 16(5), pp. 1370-1382, May 2007 [cited 69 times].
21. N. Vaswani, "Additive Change Detection in Nonlinear Systems with Unknown Change Parameters," *IEEE Trans. Signal Processing*, vol. 55(3), pp. 859-872, Mar. 2007 [this or its conference versions cited 42 times].
22. #N. Vaswani, R. Chellappa, "Principal Component Null Space Analysis for Image and Video Classification," *IEEE Trans. Image Processing*, vol. 15(7), pp. 1816-1830, Jul. 2006 [this or its conference versions cited 62 times].
23. #N. Vaswani, A. Roy Chowdhury, R. Chellappa, "Shape Activity: A Continuous State HMM for Moving/Deforming Shapes with Application to Abnormal Activity Detection," *IEEE Trans. Image Processing*, vol. 14(10), pp. 1603-1616, Oct. 2005 [cited 110 times].
24. A. Ramamoorthy, N. Vaswani, S. Chaudhury, S. Bannerjee, "Recognition of Dynamic Hand Gestures," *Pattern Recognition*, vol. 36(9), pp. 2069-2081, Sep. 2003 [cited 123 times].
25. B. Song, N. Vaswani, A. Roy-Chowdhury, "Closed-loop Tracking and Change Detection in Multi-Activity Sequences," in *Proc. IEEE Intl. Conf. Computer Vision and Pattern Recognition (CVPR)*, 2007. **Acceptance rate: 25%.**
26. Y. Rathi, N. Vaswani, A. Tannenbaum, A. Yezzi, "Particle Filtering for Geometric Active Contours and Application to Tracking Deforming Objects," in *Proc. IEEE Intl.*

*Conf. Computer Vision and Pattern Recognition (CVPR)*, 2005, **Oral. Acceptance rate: 6%.**

27. **N. Vaswani**, “Bound on Errors in Particle Filtering with Incorrect Model Assumptions and its Implication for Change Detection,” in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2004. **Acceptance: 40-50%, Paper selected as an outstanding paper (top 15% papers) in Signal Processing Theory and Methods category of ICASSP papers. Net acceptance: 6-7.5%**
28. **N. Vaswani**, A. Roy-Chowdhury, R. Chellappa, “Activity Recognition Using the Dynamics of the Configuration of Interacting Objects,” in *Proc. IEEE Conf. Computer Vision and Pattern Recognition (CVPR)*, 2003. **Acceptance rate: 25%.**

## 2. Book Chapters

1. **N. Vaswani**, C. Qiu, B. Lois, H. Guo, J. Zhan, “Online (Recursive) Robust Principal Components’ Analysis”, in *Handbook on Robust Low-Rank and Sparse Matrix Decomposition: Applications in Image and Video Processing*, Eds. T. Bouwmans, CRC Press, Taylor and Francis Group, to appear
2. **N. Vaswani** and W. Lu, “Recursive Reconstruction of Sparse Signal Sequences” in *Filtering from Undersampled Data with an Introduction to Compressed Sensing*, Springer, Eds M. Mihaylova, A. Carmi, S. Godsill, 2014
3. W. Lu, I. Atkinson and **N. Vaswani**, “Recursive Reconstruction of Highly Undersampled Functional MRI Sequences”, in *Physics, Image Reconstruction, and Analysis*, Taylor and Francis, Eds A. Majumdar and R. Ward, to appear.
4. **N. Vaswani**, A.K. Agrawal, Q. Zheng, R. Chellappa, “Moving Object Detection and Compression in IR Sequences,” in *Computer Vision Beyond the Visible Spectrum*, B. Bhanu and I. Pavlidis, Eds. New York: Springer, 2004, ch. 5, pp. 141-165.

## 3. Formally Invited Lectures and Presentations at Universities

- **Dynamic Structured (Big) Data Recovery**
  - ECE Dept. Seminar, Texas A&M (TAMU), College Station, TX, April 2017
- **Dynamic Robust PCA**
  - ECE Dept. Seminar, University of Rochester, Rochester, NY, March 2017
- **Online Dynamic Robust PCA**
  - Dept. Seminar, IIT-Bombay, March 2016
  - Dept. Seminar, IIT-Delhi, March 2016
  - Dept. Seminar, University of Southern California (USC), February 2016
- **Online Robust PCA or Online Sparse + Low-Rank Matrix Recovery**
  - Networks and DSP seminar, UC Berkeley, October 2015
  - Seminar in Communication Theory and Systems, UC San Diego (UCSD), Oct 2015
  - Information Systems Lab (ISL) Colloquium, Stanford University, October, 2015
  - EE Dept. seminar, Heriott-Watt University, Edinburgh, UK, June 2015
  - CSP seminar, University of Michigan, Ann Arbor, MI, March 2015
  - Michigan State University, East Lansing, MI, March 2015
  - DSP Seminar, University of Illinois, Urbana-Champaign (UIUC), March 2015
  - ECE Department Seminar, Carnegie Mellon University (CMU), Pittsburgh, PA, February 2015
  - California Institute of Technology (Caltech), Pasadena, CA, February 2015
  - Rice University, Houston, TX, November 2014
  - University of Texas at Austin (UT-Austin), TX, November 2014

- Texas A&M University (TAMU), College Station, TX, November 2014
- University of Iowa, Iowa City, IA, October 2014
- **Dynamic Structured Signals' Recovery and Applications in Bioimaging**
  - Northwestern University, April 2014
  - ECE Department Colloquium at University of Illinois, Urbana-Champaign (UIUC), December 2013
- **Recursive Sparse Recovery and Applications in Dynamic Imaging**
  - Department Seminar at Engineering division at Brown University, Providence, RI, February 2011
- **Recursive Reconstruction of Sparse Signal Sequences**
  - Iowa State Mathematics Dept Colloquium, October 2012
  - Indian Institute of Science (IISc), Bangalore, India, September 2011
  - University of Maryland, College Park, MD, March 2011
  - California Institute of Technology (Caltech), May 2010
  - Princeton University, May 2010
  - Johns Hopkins University (JHU), Baltimore, MD, March 2011
  - Mitsubishi Electric Research Labs (MERL), Boston, MA, May 2011
  - University of California, Santa Barbara (UCSB), May 2010
  - University of California, Los Angeles (UCLA), May 2010
  - Northwestern University, May 2010
  - University of California, San Diego (UCSD), October 2009

#### 4. Formally Invited Lectures and Presentations at Workshops and Conferences

##### **Invited Conference or Workshop Short Talks**

- Improved Performance Guarantees for Correlated-PCA: PCA when Data and Noise are Correlated
  - Information Theory and Applications (ITA) workshop, San Diego, CA, February 2017
- Online and Offline Robust PCA: Novel Algorithms and Performance Guarantees
  - Information Theory and Applications (ITA) workshop, San Diego, CA, February 2016
- A Correctness Result for Online Robust PCA
  - Information Theory and Applications (ITA) workshop, San Diego, CA, February 2015
- A Correctness Result for Online Sparse + Low-Rank Matrix Recovery
  - International Conference on Signal Processing and Communications (SPCOM), Indian Institute of Science (IISc), Bangalore, India, July 2014
- Recursive Robust PCA or Recursive Sparse Recovery in Large but Structured Noise
  - Information Theory and Applications (ITA) workshop, San Diego, CA, February 2014
- Performance Guarantees for Undersampled Recursive Sparse Recovery in Large but Structured Noise
  - IEEE Global Conf. on Signal and Info. Processing (GlobalSIP), December 2013
- Stability (over time) of Modified-CS for Recursive Causal Sparse Reconstruction
  - Allerton Conf. on Communications, Control and Computing, 2010
- Particle Filtered Modified Compressive Sensing for tracking signal sequences
  - Asilomar Conf. Signals, Systems and Computers, 2010.
- Causal and Recursive Reconstruction of Sparse Signal Sequences
  - Institute for Operations Research and Management Sciences (INFORMS) Annual Meeting, Compressed Sensing Special Session, San Diego, CA, October 2009

- Efficient importance sampling techniques for large dimensional and multimodal posterior computations
  - DSP Workshop, 2009
- Particle Filter with Efficient Importance Sampling and Mode Tracking (PF-EIS-MT) and its Application to Landmark Shape Tracking
  - Asilomar Conf. Signals, Systems and Computers, 2007

**Invited Workshop Talks (long talks)**

- PF-EIS and PF-MT: Particle Filtering with Efficient Importance Sampling and with Mode Tracking and Applications in Deformable Contour Tracking
  - SAMSI Sequential Monte Carlo Mid-Program Workshop, Raleigh, NC, February 2009
- Particle Filters for Large Dimensional State Spaces with Multimodal Observation Likelihoods
  - SAMSI Sequential Monte Carlo Opening Workshop, Raleigh, NC, September 2008
- Deformable Contour Tracking
  - SAMSI Workshop on Geometry and Statistics of Shape Spaces, Raleigh, NC, July 2007
- Deformable Contour Tracking
  - IPAM Workshop on Image Processing for Random Shapes, Los Angeles, CA, May 2007
- Deformable Contour Tracking
  - IMA Workshop on Shape Spaces, Minneapolis, MN, April 2006

5. Peer-Reviewed Conference Proceedings, Bulletins, or Reports – In Print/Accepted (acceptance rate for most of the conferences listed below is around 45-50%)

1. S. Nayer\*, N. Vaswani and Y. Eldar, “Low Rank Phase Retrieval”, *Proc. IEEE Intl. Conf. Acous. Speech. Sig. Proc. (ICASSP)*, 2017
2. S. Nayer\* , N. Vaswani and Y. Eldar, “Low Rank Matrix Recovery From Column-Wise Phaseless Measurements”, IEEE Statistical Signal Processing (SSP) workshop, 2016
3. H. Guo\* and N. Vaswani, “Video denoising via online sparse and low-rank matrix decomposition”, *IEEE Statistical Signal Processing (SSP) workshop*, 2016
4. B. Lois\* and N. Vaswani, “Online Robust Matrix Completion”, *Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop*, 2015, only abstracts
5. B. Lois\* and N. Vaswani, “Online Matrix Completion and Online Robust PCA”, *Proc. IEEE Intl. Symp. Info. Theory (ISIT)*, 2015
6. B. Lois\* and N. Vaswani, “A Correctness Result for Online Robust PCA”, *Proc. IEEE Intl. Conf. Acous. Speech. Sig. Proc. (ICASSP)*, 2015
7. J. Zhan\* and N. Vaswani, Robust PCA with Partial Subspace Knowledge, *Proc. IEEE Intl. Symp. Info. Theory (ISIT)*, 2014
8. J. Zhan\* and N. Vaswani, Performance Guarantees for ReProCS -- Correlated Low-Rank Matrix Entries Case, *Proc. IEEE Intl. Symp. Info. Theory (ISIT)*, 2014
9. H. Guo\*, C. Qiu\* and N. Vaswani, “Practical ReProCS for Separating Sparse and Low-dimensional Signal Sequences from their Sum – Part 2”, *Proc. IEEE Global Conf. on Signal and Info. Processing (GlobalSIP)*, 2014
10. H. Guo\*, C. Qiu\* and N. Vaswani, “Practical ReProCS for Separating Sparse and Low-dimensional Signal Sequences from their Sum – Part 1”, *Proc. IEEE Intl. Conf. Acous. Speech Sig. Proc. (ICASSP)*, 2014

11. B. Lois\*, **N. Vaswani** and C. Qiu\*, Performance Guarantees for Undersampled Recursive Sparse Recovery in Large but Structured Noise, *IEEE Global Conf. on Signal and Info. Processing (GlobalSIP)*, 2013 **(invited)**
12. C. Qiu\* and **N. Vaswani**, Recursive Sparse Recovery in Large but Structured Noise - Part 2, *Proc. IEEE Intl. Symp. Info. Theory (ISIT)* 2013
13. J. Zhan\* and **N. Vaswani**, Time Invariant Error Bounds for Modified-CS based Sparse Signal Sequence Recovery, *Proc. IEEE Intl. Symp. Info. Theory (ISIT)* 2013
14. C. Qiu\*, **N. Vaswani** and L. Hogben, Recursive Robust PCA or Recursive Sparse Recovery in Large but Structured Noise, *Proc. IEEE Intl. Conf. Acous. Speech Sig. Proc. (ICASSP)*, 2013
15. J. Zhan\*, **N. Vaswani** and I. Atkinson, Separating Sparse and Low-Dimensional Signal Sequence from Time-varying Undersampled Projections of their Sums, *Proc. IEEE Intl. Conf. Acous. Speech. Sig. Proc. (ICASSP)*, 2013
16. R. Sarkar\*, **N. Vaswani** and S. Das, Tracking Sparse Signal Sequences from Nonlinear/Non-Gaussian Measurements and Applications in Illumination-Motion Tracking, *Proc. IEEE Intl. Conf. Acous. Speech. Sig. Proc. (ICASSP)*, 2013
17. C. Qiu\* and **N. Vaswani**, Recursive Sparse Recovery in Large but Correlated Noise,” *Proc. Allerton Conf. Communication, Control and Computing*, 2011
18. C. Qiu\* and **N. Vaswani**, Support Predicted Modified-CS for Recursive Robust Principal Components' Pursuit, *Proc. IEEE Intl. Symp. Info. Theory (ISIT)*, 2011
19. W. Lu\*, T. Li\*, I. Atkinson, **N. Vaswani**, Modified-CS-Residual for Recursive Reconstruction of Highly Undersampled Functional MRI Sequences, *Proc. IEEE Intl. Conf. Image Proc. (ICIP)*, 2011
20. F. Raisali\* and **N. Vaswani**, Stability (over time) of Regularized Modified-CS (noisy) for Recursive Causal Sparse Reconstruction, *Proc. Conf. Info. Sciences and Systems (CISS)*, 2011
21. **N. Vaswani**, “Stability (over time) of Modified-CS for Recursive Causal Sparse Reconstruction,” *Proc. Allerton Conf. Communication, Control and Computing*, 2010 **(invited)**.
22. C. Qiu\* and **N. Vaswani**, “Real-time Robust Principal Components' Pursuit”, *Proc. Allerton Conf. Communication, Control and Computing*, 2010.
23. W. Lu\* and **N. Vaswani**, “Exact Reconstruction Conditions and Error Bounds for Regularized Modified Basis Pursuit,” *Proc. Asilomar Conf. Signals, Systems and Computers*, 2010.
24. S. Das\* and **N. Vaswani**, “Particle Filtered Modified Compressive Sensing (PF-mod-CS) for tracking signal sequences,” *Proc. Asilomar Conf. Signals, Systems and Computers*, 2010 **(invited)**.
25. W. Lu\* and **N. Vaswani**, “Modified Basis Pursuit Denoising (Modified-BPDN) for Noisy Compressive Sensing with Partially Known Support,” in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2010.
26. W. Lu\* and **N. Vaswani**, “Modified Compressive Sensing for Real-time Dynamic MR Imaging,” in *Proc. IEEE Intl. Conf. Image Processing (ICIP)*, 2009.
27. **N. Vaswani** and W. Lu\*, “Modified-CS: Modifying Compressive Sensing for Problems with Partially Known Support,” in *Proc. IEEE Intl. Symp. Information Theory (ISIT)*, 2009.
28. **N. Vaswani**, “Analyzing Least Squares and Kalman Filtered Compressed Sensing,” in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2009.
29. C. Qiu\*, W. Lu\* and **N. Vaswani**, “Real-time Dynamic MR Image Reconstruction using Kalman Filtered Compressed Sensing,” in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2009.



30. S. Das\* and N. Vaswani, "Efficient importance sampling techniques for large dimensional and multimodal posterior computations," in *Proc. IEEE Digital Signal Processing/SPE Workshop*, Miami FL, Jan 2009 (**invited**).
31. N. Vaswani, Kalman Filtered Compressed Sensing," in *Proc. IEEE Intl. Conf. Image Processing (ICIP)*, 2008.
32. S. Das\* and N. Vaswani, "Model-based Compression of Nonstationary Landmark Shape Sequences," in *Proc. IEEE Intl. Conf. Image Processing (ICIP)*, 2008.
33. A. Kale and N. Vaswani, Generalized ELL for Detecting and Tracking Through Illumination Model Changes," in *Proc. IEEE Intl. Conf. Image Processing (ICIP)*, 2008.
34. N. Vaswani and S. Das, "Particle Filter with Efficient Importance Sampling and Mode Tracking (PF-EIS-MT) and its Application to Landmark Shape Tracking," in *Proc. Asilomar Conf. Signals, Systems and Computers*, 2007 (**invited**).
35. N. Vaswani, "PF-EIS and PF-MT: New Particle Filtering Algorithms for Multimodal Observation Likelihoods and Large Dimensional State Spaces," in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2007.
36. A. Kale, N. Vaswani, C. Jaynes, "Particle Filter with Mode Tracker (PF-MT) for Visual Tracking across Illumination Change," in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2007.
37. N. Vaswani, A. Yezzi, Y. Rathi, A. Tannenbaum, "Time-varying Finite Dimensional Basis for Tracking Contour Deformations," in *Proc. IEEE Conf. Decision and Control (CDC)*, 2006.
38. B. Song, N. Vaswani, A.K. Roy-Chowdhury, "Summarization and Indexing of Human Activity Sequences," in *Proc. IEEE Conf. Image Processing (ICIP)*, 2006.
39. N. Vaswani, A. Yezzi, Y. Rathi, A. Tannenbaum, "Particle Filters for Infinite (or Large) Dimensional State Spaces – Part 1," in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2006.
40. N. Vaswani, "Particle Filters for Infinite (or Large) Dimensional State Spaces – Part 2," in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2006.
41. N. Vaswani, R. Chellappa, "NonStationary 'Shape Activities,'" in *Proc. IEEE Conf. Decision and Control (CDC)*, 2005.
42. N. Vaswani, "The Modified CUSUM Algorithm for Slow and Drastic Change Detection in General HMMs with Unknown Change Parameters," in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2005.
43. N. Vaswani, "Change Detection in Partially Observed Nonlinear Dynamic Systems with Unknown Change Parameters," in *Proc. American Control Conf. (ACC)*, 2004.
44. N. Vaswani, R. Chellappa, "Classification Probability Analysis of Principal Component Null Space Analysis," in *Proc. Intl. Conf. Pattern Recognition (ICPR)*, 2004.
45. N. Vaswani, A. Roy-Chowdhury, R. Chellappa, "Statistical Shape Theory for Activity Modeling," in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2003.
46. N. Vaswani, R. Chellappa, "A Particle Filtering Approach to Abnormality Detection in Nonlinear Systems and its Application to Abnormal Activity Detection," in *Proc. 3rd Intl. Workshop on Statistical and Computational Theories of Vision*, held in conjunction with ICCV, 2003.
47. N. Vaswani, "A Linear Classifier for Gaussian Class Conditional Distributions with Unequal Covariance Matrices," in *Proc. Intl. Conf. Pattern Recog. (ICPR)*, 2002.
48. N. Vaswani, R. Chellappa, "Best View Selection and Compression of Moving Objects in IR Sequences," in *Proc. IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2001.

## B. Funded Grants and Contracts

- **CIF: Small: Online Algorithms for Streaming Structured Big-Data Mining**, October 2015 – September 2018, amount - \$442,385, PI: Namrata Vaswani, Co-PI: None. Agency: National Science Foundation (CCF - CIF)
- **Distributed Recursive Robust Estimation: Theory, Algorithms and Applications in Single and Multi-Camera Computer Vision**, July 2015 – June 2018, amount: \$250,000, PI: Namrata Vaswani, Co-PI: Nicola Elia. Agency: National Science Foundation (Engineering - ECCS)
- **Novel Machine Learning Approaches for Low-light Image or Video Denoising**, Phase 1 - January 2015--August 2015, Phase 2 - August 2015--May 2016, Rockwell Collins and matching funds from Regents Innovations Fund, total amount - \$200,000, my share - \$100,000, split equally over two phases. PI: Namrata Vaswani, Co-PI: Soumik Sarkar
- **IDBR Type A – High-Throughput, Large-Scale Plant Phenotyping Platform**, March 2014 – February 2017, amount ~ \$697,550, my share ~ \$180,000, PI: Liang Dong, co-PIs: Maneesha Aluru and Namrata Vaswani. Agency: National Science Foundation (Division of Biological Infrastructure)
- **CIF: Small: Recursive Robust Principal Components Analysis (PCA)**, September 2011 – August 2015, NSF (CCF), amount - \$396,659, my share ~ \$366,000, PI: Namrata Vaswani, co-PI: Fritz Keinert. Agency: National Science Foundation (CCF - CIF)
- **Greenhouse on a Chip: A Fully Integrated Microfluidic Platform for Large-scale High-throughput Plant Phenomics**, Plant Sciences Institute, Iowa State University, July 2012 - June 2013, amount~\$52,000, PI: Liang Dong, co-PI: Maneesha Aluru and Namrata Vaswani, my share ~ \$10,000
- **RI: Small: Exploiting Correlated Sparsity Pattern Change in Dynamic Vision Problems**, September 2011 – August 2015, amount - \$204,395. PI: Namrata Vaswani, co-PI: none. Agency: National Science Foundation (IIS-RI).
- **CCF (CIF): Small: Recursive Reconstruction of Sparse Signal Sequences**, July 2009 – June 2013, NSF (CCF), amount - \$279,279 + \$12,000 (REU supplement), PI: Namrata Vaswani, co-PI: none
- **Change Detection in Nonlinear Systems and Applications in Shape Analysis**, August 2007 – July 2011, NSF (Engineering - ECCS), amount - \$265,529 + \$12,000 (REU supplement), PI: Namrata Vaswani, co-PI: none. Agency: National Science Foundation (Engineering - ECCS)
- **New Faculty Grant Development Award**, June – August 2006, Vice Provost for Research Office, Iowa State University, amount – \$12,000, PI: Namrata Vaswani, co-PI: none

### III. TEACHING / EDUCATION ACTIVITIES

#### A. Instruction for ISU

- **Graduate courses**
  - Special Topics: Statistical Machine Learning (EE 520): Fall 2015, Fall 2016
  - Special Topics: Compressive Sensing and Matrix Completion (EE 520): Spring 2013
  - Special Topics: Compressive Sensing (EE 520): Spring 2009
  - Estimation and Detection Theory (EE 527): Spring 2008, Spring 2010, Spring 2012, Spring 2014, offered to off-campus students in all years
  - Digital Signal Processing (EE 524): Fall 2010
  - Digital Image Processing (EE 528): Spring 2007, Fall 2009
  - Special Topics: Computer Vision (EE 520): Fall 2005
- **Undergraduate courses**
  - Probabilistic Methods for Electrical Engineers (EE 322): Fall 2006, 2007, 2008, Spring 2009, 2011, Fall 2014

- Introduction to Digital Signal Processing (EE 424): Spring 2012
- Signals and Systems (EE 224, Recitations or/and Labs): Spring 2014, Fall 2013, Fall 2011, Spring 2010 and Fall 2006

#### B. Curriculum Development Activity for ISU

- Special topics course on Statistical Machine Learning (EE 520)
  - [http://www.ece.iastate.edu/~namrata/MachineLearning\\_class/](http://www.ece.iastate.edu/~namrata/MachineLearning_class/)
- Special topics course on Matrix Completion and Compressive Sensing (EE 520)
  - [http://www.ece.iastate.edu/~namrata/MC\\_CSclass](http://www.ece.iastate.edu/~namrata/MC_CSclass)
- Special topics course on Compressive Sensing (EE 520)
  - <http://www.ece.iastate.edu/~namrata/CSclass>
- Digital Image Processing (EE 528)
  - <http://www.ece.iastate.edu/~namrata/EE528>
- Estimation and Detection Theory (EE 527)
  - Updated the material on Bayesian estimation – MMSE estimation and Kalman filtering
  - Included a detailed discussion of laws of large numbers and Chernoff bounding based inequalities
- Added appropriate level modules on sparse recovery and compressive sensing (at appropriate levels) to various undergraduate and graduate courses
  - Signals and Systems I (EE 224) – lab on compressive sensing (beyond Nyquist)
  - Introduction to DSP (EE 424) – lab on undersampled MRI image reconstruction
  - Estimation and Detection Theory (EE 527) – two lectures on sparse recovery, compressive sensing problem definition, algorithms and applications
  - DSP (EE 524)

#### C. Service as Major Professor on Graduate Student Committees

- **Graduated Ph.D. students**
  1. Jinchun Zhan, Ph.D., Fall 2015. **Received the Research Excellence Award**
  2. Brian Lois, Ph.D., Summer 2015 (co-advised with Prof. Leslie Hogben, Mathematics major, EE co-major). **Received the Research Excellence Award**
  3. Man Basnet, Ph.D., Summer 2013 (co-advised with Prof. Fritz Keinert, Mathematics major, EE co-major), Postdoctoral fellow in Mathematics dept. at ISU
  4. Chenlu Qiu, Ph.D., Summer 2013, Scientist at Traffic Management Research Institute, China
  5. Wei Lu, Ph.D., Fall 2011, Senior Algorithms Engineer at KLA-Tencor, San Jose, CA
  6. Samarjit Das, Ph.D., Fall, 2010, Senior Research Scientist at Bosch North America Research Labs, Pittsburgh, PA. Received the **Teaching Excellence Award**.
- **Graduated M.S. students**
  1. Rituparna Sarkar, M.S., Fall 2012
  2. Fardad Raisali, M.S. Spring 2012
  3. Taoran Li, M.S. Summer 2011
- **Current Ph.D. Students**
  1. Han Guo, Ph.D. student, started Fall 2012
  2. Sara Nayer, Ph.D. student, started Spring 2015
  3. Praneeth Kurpad, Ph.D. student, starting Spring 2016
  4. Zhengyu Chen, Ph.D. student, started Fall 2016
  5. Vaheed Daneshpajooh, Ph.D. student, will start in Spring 2017

#### D. Supervision of Undergraduate Research and Independent Study

- Christopher Sheafe (ECE), Trevor Steil (Math), Jonathan Lai (Math), REU students, Summer 2013, studied modified-CS and weighted CS using simulations as well as theoretical analysis.
- Tyler Stapler, REU student, Summer 2012
- Matt Boyce, REU student, Summer 2011
- Jennifer Nixon, REU student, Summer 2010
- Matt Rich, REU student, Spring 2010
- Xiang Li, undergraduate research student, Spring and Summer 2008

#### IV. EXTENSION/PROFESSIONAL PRACTICE ACTIVITIES

##### A. Editorial Service for Journals

- Associate Editor, IEEE Transactions on Signal Processing  
March 2017 – present  
October 2009 – February 2013

##### B. Offices Held in Professional Societies

- Chair-Elect of Women in Signal Processing Sub-committee of IEEE Signal Processing Society, January 2017 - present
- Elected member of the Signal Processing Theory and Methods technical committee of the IEEE Signal Processing Society, January 2016 – present
- Elected member of the Image Video and Multidimensional Signal Processing (IVMSP) technical committee of the IEEE Signal Processing Society, January 2015 – present
- Member of the Women in Signal Processing Committee of the IEEE Signal Processing Society, April 2015 – present

##### C. Tutorial Presentation, Workshop and Symposium Organization

- **Tutorial Presenter at ICASSP 2017**
  - - Will present a tutorial on Big Data Mining in Large but Structured Noise – in planning
- **Symposium and Workshop Organization (as Co-Chair)**
  - Robust Subspace Learning and Applications in Computer Vision Workshop at ICCV 2017 (IEEE Intl. Conf. on Computer Vision)
  - Big Data Analysis and Challenges in Medical Imaging at GlobalSIP 2016
  - Robust Subspace Learning Workshop at ICCV 2015 (IEEE Intl. Conf. on Computer Vision)
  - Information Processing in Big Data Symposium at GlobalSIP 2014
  - Compressed Sensing and Matrix Completion Min-symposium at ILAS 2017 (Meeting of the International Linear Algebra Society) – in planning
- Area Chair for interpolation for IEEE Intl. Conf. Image Processing (ICIP), 2009
- Tutorials Chair for IEEE Intl. Conf. Image Processing (ICIP), 2008

##### D. Grant Review Panels

- National Science Foundation Panelist, 2008, 2010, 2011, 2012
- Served as an ad hoc reviewer for Israel Science Foundation

##### E. Other Extension/Professional Practice Activities

- Technical Program Committee Member, IEEE Intl Conf. Sig. Proc. and Comm (SPCOM), IISc, Bangalore, 2012 and 2014
- Technical Program Committee Member, IEEE Statistical Signal Processing (SSP) Workshop 2012

- Organized Special Sessions at
  - Asilomar 2010: Recursive reconstruction of sparse signal sequences
  - ICIP 2008: Landmark shape sequence analysis
- Performed book proposal reviews for Cambridge University Press and others
- Program Committees: IEEE Intl. Conf. Comp. Vis. Pattern Recog. (CVPR), 2008, 2009; European Conf. Comp. Vis. (ECCV), 2008; IEEE Intl. Conf. Comp. Vis. (ICCV), 2007
- Journal Reviewing:
  - IEEE Trans. Signal Proc. (TSP), IEEE Trans. Information Theory, IEEE Trans. Image Processing (TIP), IEEE Trans. Pattern Analysis and Machine Intelligence (PAMI), EURASIP Journal on Applied Signal Processing, IEEE Trans. Auto. Control and Automatica
- Conference Reviewing:
  - IEEE Intl. Conf. Acoustics, Speech and Signal Processing (ICASSP), IEEE Intl. Conf. Image Processing (ICIP), IEEE Intl. Conf. Comp. Vision (ICCV), IEEE Conf. Dec. and Control (CDC), Globecom, Milcom
- Consulted for Zenph Sound Innovations in 2010
- Thesis Examiner for a Ph.D. student from University of Newcastle, Australia, 2011

## V. INSTITUTIONAL SERVICE ACTIVITIES

### A. College-Level Service

- Member of College of Engineering's Diversity Committee, Fall 2010 – Fall 2015

### B. Department-Level Service

- Member of the department chair search committee, 2015-2016
- Actively participated in recruiting faculty candidates for the Presidential Hiring Initiative on Big Data (not on search committee)
- Academic Area Chair for Communications and Signal Processing, 2013-present
- Member of Graduate Committee, 2013-present (except in Spring 2010 due to FPDA)
- Strategic Area Chair for Bioengineering, 2011-2012
- Course Coordinator for EE 322 (Probabilistic Methods for Electrical Engineers) and EE 528 (Digital Image Processing)
- Member, Graduate Admissions Committee, 2008-2009
- Member, Elections Committee, 2006-2008
- Member, Strategic Planning Committee, 2005-2006, 2009, 2012, 2013
- Member, Promotion and Tenure Committee, 2008-2009
- Member, Distinguished Lectures Committee, 2009-2010