Contact Information

University of Delaware   hong@udel.edu
314 Evans Hall   https://dahong.gitlab.io
Newark, DE 19716   https://scholar.google.com/citations?user=eCpkx4cAAAAJ

Research Interests

- Low-rank matrix and tensor estimation
- Heterogeneous, messy, and mis_ing data
- Large-dimensional and multivariate statistics
- Random matrix theory
- Statistical machine learning
- Imaging and inverse problems

Education

05/2019	**Ph.D.**	Electrical Engineering: Systems	University of Michigan
12/2015	**M.S.**	Electrical Engineering: Systems	University of Michigan (GPA: 4.0)
05/2013	**B.S.**	Electrical and Computer Engineering, Mathematics (double major)	Duke University (Summa Cum Laude, GPA: 3.9)

Ph.D. Dissertation

05/2019   **Learning Low-Dimensional Models for Heterogeneous Data**
Advisers: Laura Balzano (EECS) and Jeffrey A. Fessler (EECS)
https://deepblue.lib.umich.edu/handle/2027.42/150043

Positions

2023 – Now   **Assistant Professor**
Department of Electrical and Computer Engineering, University of Delaware
Resident Faculty of the Data Science Institute

2021 – 2023   **NSF Mathematical Sciences Postdoctoral Research Fellow**
Department of Statistics and Data Science, University of Pennsylvania
(sponsoring scientist: Edgar Dobriban)

2019 – 2021   **Postdoctoral Scholar**
Department of Statistics and Data Science, University of Pennsylvania
(mentor: Edgar Dobriban)

Summer 2017   **Data Science Graduate Summer Intern**
Sandia National Labs (Livermore, CA)
(mentors: Clifford Anderson-Bergman and Tamara G. Kolda)

Fall 2016, Fall 2017, Winter 2018   **Graduate Student Instructor**
Department of Electrical Engineering and Computer Science, University of Michigan
(courses: Computational Data Science [EECS551/598]; Matrix Methods for Signal Processing, Data Analysis & Machine Learning [EECS551])

2014 – 2019   **NSF Graduate Research Fellow**
Department of Electrical Engineering and Computer Science, University of Michigan
(mentors: Laura Balzano and Jeffrey A. Fessler)

2013 – 2019 **Graduate Student Research Assistant**
Department of Electrical Engineering and Computer Science, University of Michigan
(mentors: Raj Rao Nadakuditi, Laura Balzano and Jeffrey A. Fessler)

Spring 2013 **Undergraduate Teaching Assistant**
Department of Electrical and Computer Engineering, Duke University
(course: Introduction to Signals and Systems [ECE280])

2012 – 2013 **Undergraduate Research Assistant**
Sensor Array and Multipath Group, Duke University
(mentor: Jeffrey L. Krolik)

Summer 2009 **Software Development Intern**
Base Table Group, Research & Development, SAS World Headquarters
(developed suite of database test scripts)

Fellowships and Scholarships

2021 National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship

2014 National Science Foundation Graduate Research Fellowship

2013 University of Michigan Rackham Merit Fellowship

2009 Benjamin N. Duke Scholarship (Full Scholarship at Duke University)

2009 National Merit Scholarship

Honors and Awards

2022 **Editors' Highlights in Applied Physics and Mathematics, Nature Communications**
Awarded to paper: "Group testing via hypergraph factorization applied to COVID-19" (first author)

2018 **Graduate Student Instructor Award**
Department of Electrical and Computer Engineering, University of Michigan

2017 **Richard and Eleanor Towner Prize for Outstanding Ph.D. Research**
College of Engineering, University of Michigan (college-wide research award)

2017 **"Most Innovative Use of Data" Poster Prize**
Michigan Data Science (MIDAS) Annual Symposium, University of Michigan

2017 **"Best in Show Individual Poster" Prize**
Student Intern Symposium, Sandia National Labs (CA)

2017 **EECS Department Poster Presentation Prize**
Michigan Student Symp. for Interdisciplinary Statistical Sciences (MSSISS), University of Michigan

2016 **"Most Interesting Methodological Advancement" Poster Prize**
Michigan Data Science (MIDAS) Annual Symposium, University of Michigan

2016 **First place for Signal and Image Processing, Computer Vision (SIC) Poster Session**
Engineering Graduate Symposium, University of Michigan

Refereed Journal Papers (* = equal contributors)

14. **Streaming Heteroscedastic Probabilistic PCA with Missing Data.**   2025
    Kyle Gilman, **David Hong**, Jeff Fessler, Laura Balzano.
    Accepted to Transactions on Machine Learning Research, To appear.
    `https://arxiv.org/abs/2310.06277`

13. **Optimal Sample Acquisition for Optimally Weighted PCA From Heterogeneous**   2025
    Quality Sources.
    David Hong, Laura Balzano.
    IEEE Signal Processing Letters, vol. 32.
    `https://doi.org/10.1109/LSP.2025.3550280`

12. **Provable tradeoffs in adversarially robust classification.**   2023
    Edgar Dobriban*, Hamed Hassani*, **David Hong***, Alexander Robey*.
    IEEE Transactions on Information Theory, vol. 69.
    `https://doi.org/10.1109/TIT.2022.3205449`

11. **Optimally Weighted PCA for High-Dimensional Heteroscedastic Data.**   2023
    David Hong, Fan Yang, Jeffrey A. Fessler, Laura Balzano.
    SIAM Journal on Mathematics of Data Science, vol. 5, no. 1.
    `https://doi.org/10.1137/22M1470244`

10. **Group testing via hypergraph factorization applied to COVID-19.**   2022
    David Hong, Rounak Dey, Xihong Lin, Brian Cleary, Edgar Dobriban.
    Nature Communications, vol. 13.
    `https://doi.org/10.1038/s41467-022-29389-z`
    (***Selected for the Editors' Highlights in Applied Physics and Mathematics***)

9. **HePPCAT: Probabilistic PCA for Data With Heteroscedastic Noise.**   2021
   David Hong, Kyle Gilman, Laura Balzano, Jeffrey A. Fessler.
   IEEE Transactions on Signal Processing, vol. 69.
   `https://doi.org/10.1109/TSP.2021.3104979`

8. **Using viral load and epidemic dynamics to optimize pooled testing in resource-**   2021
   constrained settings.
   Brian Cleary*, James A. Hay*, Brendan Blumenstiel, Maegan Harden, Michelle Cipicchio,
   Jon Bezney, Brooke Simonton, **David Hong**, Madikay Senghore, Abdul K. Sesay, Stacey
   Gabriel, Aviv Regev, Michael J. Mina.
   Science Translational Medicine, vol. 13, no. 589.
   `https://doi.org/10.1126/scitranslmed.abf1568`

7. **Subspace clustering using ensembles of K-subspaces.**   2021
   John Lipor*, **David Hong***, Yan Shuo Tan, Laura Balzano.
   Information and Inference: A Journal of the IMA, vol. 10, no. 1.
   `https://doi.org/10.1093/imaiai/iaaa031`

6. **Baseline estimation of commercial building HVAC fan power using tensor com-**   2020
   pletion.
   Shunbo Lei, **David Hong**, Johanna L. Mathieu, Ian A. Hiskens.
   Electric Power Systems Research, vol. 189.
   `https://doi.org/10.1016/j.epsr.2020.106624`

5. **Stochastic Gradients for Large-Scale Tensor Decomposition.**   2020
   Tamara G. Kolda, **David Hong**.
   SIAM Journal on Mathematics of Data Science, vol. 2, no. 4.
   `https://doi.org/10.1137/19M1266265`

4. **Generalized Canonical Polyadic Tensor Decomposition.**   2020
   David Hong, Tamara G. Kolda, Jed A. Duersch.
   SIAM Review, vol. 62, no. 1.
   `https://doi.org/10.1137/18M1203626`

3. **Convolutional Analysis Operator Learning: Dependence on Training Data.**   2019
   Il Yong Chun*, **David Hong***, Ben Adcock, Jeffrey A. Fessler.
   IEEE Signal Processing Letters, vol. 26, no. 8.
   `https://doi.org/10.1109/LSP.2019.2921446`

2. **Asymptotic performance of PCA for high-dimensional heteroscedastic data.**   2018
   David Hong, Laura Balzano, Jeffrey A. Fessler.
   Journal of Multivariate Analysis, vol. 167.
   `https://doi.org/10.1016/j.jmva.2018.06.002`

1. **Closed-Form Expressions for Minimizing Total Harmonic Distortion in Three-Phase Multilevel Converters.**   2014
   David Hong, Sanzhong Bai, Srdjan M. Lukic.
   IEEE Transactions on Power Electronics, vol. 29, no. 10.
   `https://doi.org/10.1109/TPEL.2013.2290377`

Refereed Conference Papers in Conference Proceedings

8. **Generic Properties of Koopman Eigenfunctions for Stable Fixed Points and Periodic Orbits.**   2020
   Matthew D. Kvalheim, **David Hong**, Shai Revzen.
   Proc. Int. Symp. Math. Theory Networks and Syst. (MTNS).
   `https://doi.org/10.1016/j.ifacol.2021.06.150`

7. **Probabilistic PCA for Heteroscedastic Data.**   2019
   David Hong, Laura Balzano, Jeffrey A. Fessler.
   Proc. IEEE Int. Workshop Comput. Advances Multi-Sensor Adaptive Process. (CAMSAP).
   `https://doi.org/10.1109/CAMSAP45676.2019.9022436`

6. **Incorporating Handcrafted Filters in Convolutional Analysis Operator Learning for Ill-Posed Inverse Problems.**   2019
   Caroline Crockett, **David Hong**, Il Yong Chun, Jeffrey A. Fessler.
   Proc. IEEE Int. Workshop Comput. Advances Multi-Sensor Adaptive Process. (CAMSAP).
   `https://doi.org/10.1109/CAMSAP45676.2019.9022669`

5. **Exploration of tensor decomposition applied to commercial building baseline estimation.**   2019
   David Hong, Shunbo Lei, Johanna L. Mathieu, Laura Balzano.
   Proc. IEEE Global Conf. Signal and Inform. Process. (GlobalSIP).
   `https://doi.org/10.1109/GlobalSIP45357.2019.8969417`

4. **Learning Dictionary-Based Unions of Subspaces for Image Denoising.**   2018
   David Hong, Robert P. Malinas, Jeffrey A. Fessler, Laura Balzano.
   Proc. Eur. Signal Process. Conf. (EUSIPCO).
   `https://doi.org/10.23919/EUSIPCO.2018.8553117`
   (***Invited paper in the "Emerging Data Structure Paradigms for Subspace Estimation" special session***)

3. **Online Estimation of Coherent Subspaces with Adaptive Sampling.**   2018
Greg Ongie, **David Hong**, Dejiao Zhang, Laura Balzano.
Proc. IEEE Stat. Signal Process. Workshop (SSP).
`https://doi.org/10.1109/SSP.2018.8450830`

2. **Enhanced online subspace estimation via adaptive sensing.**   2017
Greg Ongie, **David Hong**, Dejiao Zhang, Laura Balzano.
Proc. Asilomar Conf. Signals, Syst., Comput. (Asilomar).
`http://doi.org/10.1109/ACSSC.2017.8335497`

1. **Towards a theoretical analysis of PCA for heteroscedastic data.**   2016
David Hong, Laura Balzano, Jeffrey A. Fessler.
Proc. Annu. Allerton Conf. Commun., Control, Comput. (Allerton).
`http://doi.org/10.1109/ALLERTON.2016.7852272`

Preprints (* = equal contributors)

2. **Annotation Vocabulary (Might Be) All You Need.**
Logan Hallee, Niko Rafailidis, Colin Horger, **David Hong**, Jason P Gleghorn.
In preparation.
`https://doi.org/10.1101/2024.07.30.605924`

1. **Selecting the number of components in PCA via random signflips.**
David Hong, Yue Sheng, Edgar Dobriban.
Under review.
`https://arxiv.org/abs/2012.02985`

Software

- **HePPCAT.jl**
`https://github.com/dahong67/HePPCAT.jl`
Julia package for computing probabilistic PCA for samples with heterogeneous quality.

- **WeightedPCA.jl**
`https://github.com/dahong67/WeightedPCA.jl`
Julia package for performing optimally weighted PCA for samples with heterogeneous quality.

- **FlipPA.jl**
`https://github.com/dahong67/FlipPA.jl`
Julia package for estimating the rank of heterogeneous, noisy data using parallel analysis with signflips.

- **GCPDecompositions.jl**
`https://github.com/dahong67/GCPDecompositions.jl`
Julia package for computing generalized CP tensor decompositions.

- **ConvolutionalOperatorLearning.jl**
`https://github.com/dahong67/ConvolutionalOperatorLearning.jl`
Julia package for convolutional analysis operator learning.

Talks and Posters at Conferences & Workshops

24. **Generalizing Beyond Generalized Tensor Decompositions.**   06/24/2025
Three-way Methods in Chemistry and Psychology (TRICAP) 2025, Ålesund, Norway.
(**Invited talk**)

23. **Rank estimation for PCA under heteroscedastic noise.**   06/09/2025
    International Workshop on Applied Probability 2025, Raleigh, NC, USA.
    (**Invited talk**)

22. **Adventures in PCA for Heterogeneous Quality Data.**   05/16/2024
    SIAM Conference on Applied Linear Algebra 2024, Paris, France.
    (**Invited talk**)

21. **Making PCA Robust to Heterogeneous Noise in Data.**   03/14/2024
    58th Annual Conference on Information Sciences and Systems, Princeton, NJ, USA.
    (**Invited talk**)

20. **Using higher-order moments for subspace clustering.**   01/11/2024
    Workshop on Connecting Higher-Order Statistics and Symmetric Tensors, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, Providence, RI, USA.
    (**Invited talk**)

19. **Generalized Canonical Polyadic Tensor Decomposition: Algorithms and Applications.**   08/21/2023
    10th International Congress on Industrial and Applied Mathematics (ICIAM), Waseda University, Tokyo, Japan.

18. **Low-rank matrix and tensor estimation for heterogeneous big data...in modern astronomy?.**   06/13/2023
    Statistical Challenges in Modern Astronomy VIII Conference, Pennsylvania State University, State College, PA, USA.
    (**Invited talk**)

17. **Optimally weighted PCA for high-dimensional heterogeneous-quality data.**   09/28/2022
    SIAM Conference on Mathematics of Data Science (MDS22), San Diego, CA, USA.

16. **Probabilistic PCA algorithms for heterogeneous-quality data.**   09/26/2022
    SIAM Conference on Mathematics of Data Science (MDS22), San Diego, CA, USA.

15. **HYPER: Group Testing via Hypergraph Factorization Applied to COVID-19.**   08/09/2021
    2021 Joint Statistical Meetings (JSM), Virtual Conference.

14. **Selecting meaningful principal components via random signflips.**   08/25/2020
    Bernoulli-IMS One World Symposium 2020, Virtual Conference.

13. **Selecting meaningful principal components in heterogeneous data using signflips.**   08/05/2020
    2020 Joint Statistical Meetings (JSM), Virtual Conference.

12. **Incorporating handcrafted filters in convolutional analysis operator learning for ill-posed inverse problems.**   12/17/2019
    8th IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP), Guadeloupe, West Indies.

11. **Probabilistic PCA for Heteroscedastic Data.**   12/16/2019
    8th IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP), Guadeloupe, West Indies.

10. **Understanding parallel analysis methods for rank selection in PCA.**   12/10/2019
    Random Matrices and Complex Data Analysis Workshop (RMCDAW), School of Statistics and Management, Shanghai University of Finance and Economics, Shanghai, China.
    (**Invited talk**)

9. **Exploration of tensor decomposition applied to commercial building baseline estimation.**   11/12/2019
    7th IEEE Global Conference on Signal and Information Processing (GlobalSIP), Ottawa, Canada.

8. **Asymptotic eigenstructure of weighted sample covariance matrices for large dimensional low-rank models with heteroscedastic noise.**   08/17/2019
    Workshop on Higher-Order Asymptotics and Post-Selection Inference (WHOA-PSI), Washington University in St. Louis, St. Louis, MO, USA.

7. **Optimally Weighted PCA for High-Dimensional Heteroscedastic Data.**   02/13/2019
    Information Theory and Applications (ITA) Workshop, San Diego, CA, USA.
    (**Nominated for "Graduation Day" talk**)

6. **Learning Dictionary-Based Unions of Subspaces for Image Denoising.**   09/05/2018
    26th European Signal Processing Conference (EUSIPCO), Rome, Italy.
    (**Invited poster**)

5. **Online Estimation of Coherent Subspaces with Adaptive Sampling.**   06/13/2018
    IEEE Statistical Signal Processing Workshop (SSP), Freiburg, Germany.

4. **Theoretical Analysis of PCA for Heteroscedastic Data.**   06/07/2017
    Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, Lisbon, Portugal.

3. **Towards a theoretical analysis of PCA for heteroscedastic data.**   09/28/2016
    2016 54th Annual Allerton Conference on Communication, Control, and Computing (Allerton), Monticello, IL, USA.

2. **Exploiting HF Ambient Noise to Synchronize Distributed Receivers.**   01/11/2013
    2013 US National Committee of URSI National Radio Science Meeting (USNC-URSI NRSM), Boulder, CO, USA.

1. **Minimizing 3-Phase THD in Inverters under Step Modulation.**   08/14/2010
    US-Korea Conference on Science, Technology and Entrepreneurship, Korean-American Scientists and Engineers Association, Seattle, WA, USA.

Invited Talks at External Institutions

26. **Adventures in PCA for Heterogeneous Data: Optimal Weights and Rank Estimation.**   11/14/2024
    Communications and Signal Processing (CSP) Seminar, University of Michigan, Ann Arbor, MI, USA.

25. **Adventures in PCA for Heterogeneous Quality Data.**   10/10/2024
    Guest Lecture, High-Dimensional Data Analysis Course, Innopolis University, Innopolis, Russia [virtual].

24. **Generalized Canonical Polyadic Tensor Decomposition: Algorithms and Applications.**
    Systems, Information, Learning and Optimization (SILO) Seminar, University of Wisconsin - Madison, Madison, WI, USA.
    04/24/2024

23. **Selecting the number of components in PCA (for data with heterogeneous noise) via random signflips.**
    STAT760 Guest Lecture, University of Wisconsin - Madison, Madison, WI, USA [virtual].
    11/29/2023

22. **Low-rank matrix and tensor estimation for heterogeneous big data.**
    Department of Mathematics and Statistics, Utah State University, Logan, UT, USA.
    02/08/2023

21. **Low-rank matrix and tensor estimation for heterogeneous big data.**
    Department of Statistics, Iowa State University, Ames, IA, USA.
    01/25/2023

20. **Low-rank matrix and tensor estimation for heterogeneous big data.**
    Department of Mathematical Sciences, Montana State University, Bozeman, MT, USA.
    01/23/2023

19. **Low-rank matrix and tensor estimation for heterogeneous big data.**
    Department of Statistics, Pennsylvania State University, State College, PA, USA.
    01/12/2023

18. **Low-rank matrix and tensor estimation for heterogeneous big data.**
    Department of Electrical and Computer Engineering, University of Delaware, Newark, DE, USA.
    01/10/2023

17. **Low-rank matrix and tensor estimation from heterogeneous big data.**
    Department of Statistics, Indiana University, Bloomington, IN, USA.
    12/08/2022

16. **Generalized CP Tensor Decompositions.**
    Utah State University Data Science and Statistics Seminar, Utah State University, Logan, UT, USA.
    12/06/2022

15. **Probabilistic PCA for heterogeneous-quality data.**
    Laboratorio de Procesado de Imagen (Image Processing Lab) Seminar, Universidad de Valladolid, Valladolid, Spain [virtual].
    05/17/2022

14. **Probabilistic PCA for heterogeneous-quality data.**
    Paris-Saclay Signal Seminar (S^3), Universite Paris-Saclay, France [virtual].
    05/12/2022

13. **Optimally weighted PCA for heterogeneous-quality data.**
    Applied Math Seminar, Yale University, New Haven, CT, USA [virtual].
    05/04/2022

12. **Balanced group testing via hypergraph factorization for COVID-19.**
    Information Theory (IT) Forum, Stanford University, Stanford, CA, USA [virtual].
    04/15/2022

11. **Simple, flexible and effective pooled testing via hypergraph factorization.**
    Models, Inference & Algorithms (MIA) Seminar, Broad Institute of MIT and Harvard, Cambridge, MA, USA [virtual].
    03/10/2021

10. **Selecting the number of components in PCA (for data with heterogeneous noise) via random signflips.**
    Owen Group Meeting, Department of Statistics, Stanford University, Stanford, CA [virtual].
    01/20/2021

9. **Optimally Weighted PCA for High-Dimensional Heteroscedastic Data.**
    Statistics Department Seminar, University of Pittsburgh, Pittsburgh, PA, USA [virtual].
    10/20/2020

8. **Parallel analysis for rank selection in PCA.**   03/04/2020
   Berkeley Laboratory for Information and System Sciences (BLISS) Seminar, University of California, Berkeley, Berkeley, CA, USA.

7. **Matrix and Tensor Decompositions for Unsupervised Data Analysis.**   03/03/2020
   Sandia National Labs, Livermore, CA, USA.

6. **Optimally Weighted PCA for High-Dimensional Heteroscedastic Data.**   11/08/2018
   Mahoney Group Meeting, University of California, Berkeley, Berkeley, CA, USA.

5. **Performance of PCA for High Dimensional Heteroscedastic Data.**   04/25/2017
   HELIOS Reading Group, Department of Statistics, University of Chicago, Chicago, IL, USA.

4. **Performance of PCA for High Dimensional Heteroscedastic Data.**   04/18/2017
   ECE Seminar, Duke University, Durham, NC, USA.

3. **Towards a theoretical analysis of PCA for heteroscedastic data.**   09/26/2016
   Student Seminar, Department of Statistics, University of Chicago, Chicago, IL, USA.

2. **Towards a theoretical analysis of PCA for heteroscedastic data.**   09/20/2016
   UM-SJTU Joint Institute, Shanghai Jiao Tong University, Shanghai, China.

1. **Exploiting HF Ambient Noise to Synchronize Distributed Receivers.**   03/20/2013
   Applied Math Club, North Carolina State University, Raleigh, NC, USA.

Talks and Posters at Local Symposiums

11. **Unsupervised learning with matrix and tensor decompositions (Lightning talk).**   09/22/2023
    Data Science Symposium, University of Delaware, Newark, DE, USA.

10. **Optimally Weighted PCA for High-Dimensional Heteroscedastic Data.**   12/01/2017
    Michigan Data Science (MIDAS) Data Science Research Forum, University of Michigan, Ann Arbor, MI, USA.

9. **Optimally Weighted PCA for High-Dimensional Heteroscedastic Data.**   11/10/2017
   Engineering Graduate Symposium, University of Michigan, Ann Arbor, MI, USA.

8. **Optimally Weighted PCA for High-Dimensional Heteroscedastic Data.**   10/11/2017
   Michigan Data Science (MIDAS) Annual Symposium, University of Michigan, Ann Arbor, MI, USA.
   (***Awarded "Most Innovative Use of Data"***)

7. **Generalized Tensor Decompositions.**   Summer 2017
   Student Intern Symposium, Sandia National Labs, Livermore, CA, USA.
   (***Awarded "Best in Show Individual Poster"***)

6. **Asymptotic Performance of PCA for High-Dimensional Heteroscedastic Data.**   03/24/2017
   Michigan Student Symposium for Interdisciplinary Statistical Sciences (MSSISS), University of Michigan, Ann Arbor, MI, USA.
   (***Awarded "EECS Department Poster Presentation Prize"***)

5. **Predicting the asymptotic performance of rank-1 PCA with heteroscedastic data.**   11/15/2016
   Michigan Data Science (MIDAS) Annual Symposium, University of Michigan, Ann Arbor, MI, USA.
   (***Awarded "Most Interesting Methodological Advancement"***)

4. **Predicting the asymptotic performance of rank-1 PCA with heteroscedastic data.**   11/11/2016
   Engineering Graduate Symposium, University of Michigan, Ann Arbor, MI, USA.
   (***Awarded first place for Signal and Image Processing, Computer Vision (SIC) Session***)

3. **A weighted PCA method for subspace estimation from heterogeneous data.**   06/01/2016
   Statistical Machine Learning (SML) Student Workshop, University of Michigan, Ann Arbor, MI, USA.

2. **Adaptive Dictionary Learning with Training Images for Image Formation.**   06/10/2015
   Statistical Machine Learning (SML) Student Workshop, University of Michigan, Ann Arbor, MI, USA.

1. **Finite Expressions for 3-Phase Total Harmonic Distortion in Staircase Waveforms.**   10/22/2011
   Korean-American Scientists and Engineers Association South-Atlantic Regional Conference (SARC), Durham, NC, USA.

Invited Local Talks

3. **Generalized Tensor Decompositions: Algorithms and Applications.**   03/08/2024
   Statistics Seminar, University of Delaware, Newark, DE, USA.

2. **Adventures in Tensor Decomposition for Data Science and Beyond.**   11/07/2023
   Numerical Analysis & PDE Seminar, University of Delaware, Newark, DE, USA.

1. **Low-rank matrix and tensor estimation for heterogeneous big data...in modern astronomy?.**   09/15/2023
   Astronomy and Space Seminar, University of Delaware, Newark, DE, USA.

Teaching

FA2024   **ELEG467/667 | Instructor**
Matrix and Tensor Methods for Signal Processing, Machine Learning and Data Science
Department of Electrical and Computer Engineering, University of Delaware
Developed and taught a new special topics course on matrix and tensor methods, including an introduction to areas of active research. The course was cross-listed and offered as a single class with both an undergraduate section (ELEG467) and a graduate section (ELEG667).

Student evaluations for ELEG467 (median from 6 respondents, scores out of 5)	
The instructor is well prepared for class.	5
The instructor has a thorough knowledge of the subject.	5
The instructor communicates the subject well.	5
The instructor stimulates interest in the course subject.	5
The instructor is one of my best teachers.	3.5
The instructor fostered an environment in which all students - including yourself - were treated with respect.	5
At the start of the semester, how would you have rated your knowledge on the topics covered in this course?	1.5
As of today, how would you rate your knowledge about the topics taught in this course?	3

Student evaluations for ELEG667 (median from 13 respondents, scores out of 5)	
The instructor is well prepared for class.	5
The instructor has a thorough knowledge of the subject.	5
The instructor communicates the subject well.	5
The instructor stimulates interest in the course subject.	5
The instructor is one of my best teachers.	5
The instructor fostered an environment in which all students - including yourself - were treated with respect.	5
At the start of the semester, how would you have rated your knowledge on the topics covered in this course?	3
As of today, how would you rate your knowledge about the topics taught in this course?	4

SP2024   **ELEG310 | Instructor**
Probability, Statistics, and Random Signals
Department of Electrical and Computer Engineering, University of Delaware
Taught a course on probability theory and its applications in statistics and signal processing.

Student evaluations (median from 52 respondents, scores out of 5)	
The instructor is well prepared for class.	5
The instructor has a thorough knowledge of the subject.	5
The instructor communicates the subject well.	5
The instructor stimulates interest in the course subject.	5
The instructor is one of my best teachers.	5
The instructor fostered an environment in which all students - including yourself - were treated with respect.	5
At the start of the semester, how would you have rated your knowledge on the topics covered in this course?	2
As of today, how would you rate your knowledge about the topics taught in this course?	4

FA2023   **ELEG601 | Instructor**
Convex Optimization
Department of Electrical and Computer Engineering, University of Delaware
Developed and taught a course on the theory and practice of convex optimization, including an introduction to areas of active research such as accelerated and stochastic gradient methods.

Student evaluations (median from 9 respondents, scores out of 5)	
The instructor is well prepared for class.	5
The instructor has a thorough knowledge of the subject.	5
The instructor communicates the subject well.	5
The instructor stimulates interest in the course subject.	5
The instructor is one of my best teachers.	5
The instructor fostered an environment in which all students - including yourself - were treated with respect.	5
At the start of the semester, how would you have rated your knowledge on the topics covered in this course?	2
As of today, how would you rate your knowledge about the topics taught in this course?	4

WN2018   **EECS551/598 | Graduate Student Instructor**
Computational Data Science
Department of Electrical Engineering and Computer Science, University of Michigan
Guided students during main lectures, taught discussion sections, held weekly office hours.

Student evaluations for discussion section (median from 20 respondents, scores out of 5)	
The instructor seemed well prepared for class meetings.	4.94
The instructor explained material clearly.	4.94
The instructor treated students with respect.	4.94
The instructor had regular office hours and was available at those hours.	4.91
The instructor thoroughly understood the subject matter.	4.94
The instructor was sensitive/patient to the level of student comprehension.	4.94
The instructor explained the material clearly and understandably.	4.94
The instructor had no English language problem.	4.97
Overall, the instructor was effective.	4.91

FA2017   **EECS551 | Graduate Student Instructor**
Matrix Methods for Signal Processing, Data Analysis & Machine Learning
Department of Electrical Engineering and Computer Science, University of Michigan
Taught discussion sections, held weekly office hours.

Received Departmental Graduate Student Instructor Award

Student evaluations for discussion section 1 (median from 61 respondents, scores out of 5)	
The instructor seemed well prepared for class meetings.	4.90
The instructor explained material clearly.	4.91
The instructor treated students with respect.	4.96
The instructor had regular office hours and was available at those hours.	4.94
The instructor thoroughly understood the subject matter.	4.91
The instructor was sensitive/patient to the level of student comprehension.	4.91
The instructor explained the material clearly and understandably.	4.95
The instructor had no English language problem.	4.97
Overall, the instructor was effective.	4.96

Student evaluations for discussion section 2 (median from 73 respondents, scores out of 5)	
The instructor seemed well prepared for class meetings.	4.89
The instructor explained material clearly.	4.87
The instructor treated students with respect.	4.87
The instructor had regular office hours and was available at those hours.	4.83
The instructor thoroughly understood the subject matter.	4.89
The instructor was sensitive/patient to the level of student comprehension.	4.86
The instructor explained the material clearly and understandably.	4.88
The instructor had no English language problem.	4.94
Overall, the instructor was effective.	4.89

FA2016   **EECS551 | Graduate Student Instructor**
Matrix Methods for Signal Processing, Data Analysis & Machine Learning
Department of Electrical Engineering and Computer Science, University of Michigan
Helped guide students during laboratory activities in lecture.

SP2013   **ECE280 | Undergraduate Teaching Assistant**
Introduction to Signals and Systems
Department of Electrical and Computer Engineering, Duke University
Graded assignments, held weekly office hours, conducted exam review sessions.

Thesis Students

2. **Alex Mulrooney** (Senior Thesis student in ECE)
   Thesis Title: *Algorithms for Generalized Symmetric CP Tensor Decomposition*
   Graduated: May 2025

1. **Suhas Cristy Mathey** (Master's Thesis student in ECE)
   Thesis Title: *Hyperspectral Image Analysis via Subspace Clustering*
   Graduated: January 2025

Visiting Research Interns

6. **Camilo Rivera** (Colombian Summer Exchange, Summer 2025)
   Topic: Coupled Generalized CP Decompositions

5. **Isabel Cano** (Colombian Summer Exchange, Summer 2025)
   Topic: Generalized multilinear models

4. **Pedro Sophia** (Colombian Summer Exchange, Summer 2024)
   Topic: Generalized tensor decomposition for electric grid data

3. **Krystifer Campos** (Colombian Summer Exchange, Summer 2024)
   Topic: Optimally weighted PCA for doubly heteroscedastic data

2. **Lorenzo Ramirez Perales** (DSU Summer Program, Summer 2024)
   Topic: Data Science with Generalized Tensor Decompositions

1. **Gianna Baker** (ECE REU, Summer 2024)
   Topic: Implementing Generalized Canonical Polyadic Tensor Decomposition Methods

Service on Ph.D. committees

3. **Samet Bayram** (Ph.D. in Electrical and Computer Engineering)   Fall 2024 - present

2. **Kyle Regan** (Ph.D. in Bioinformatics Data Science)   Fall 2024 - present

1. **Bilal Riaz** (Ph.D. in Electrical and Computer Engineering)   Spring 2024 - present

Service on departmental committees

Fall 2024 – present	ECE Bachelor's in AI Task Force (ad-hoc committee)
Fall 2024 – Spring 2025	ECE Graduate Committee
Fall 2023 – present	ECE Departmental Seminar Committee

Service on university committees

Fall 2025 – present	Master of Science Program in Data Science Executive Committee

Conference and workshop organization

Fall 2024   **University of Delaware DS-DARWIN Symposium**
Served on the steering committee for the DS-DARWIN Symposium on data science and high-performance computing.

August 2023   **10th International Congress on Industrial and Applied Mathematics**
Organized a minisymposium on "Generalized and non-Gaussian Tensor Decompositions".

April 2018   **Michigan Student Symp. for Interdisciplinary Statistical Sciences (MSSISS)**
Served as one of the student symposium organizers, represented the Department of Electrical Engineering and Computer Science.

Outreach and Volunteering

Summer 2024   **Research Mentor for RISE Summer Academy**
Resources To Inspire Successful Engineers, University of Delaware, Newark, DE, USA
Mentored incoming first-year students from historically underrepresented backgrounds, providing them with experiential learning in data science research.

Winter 2019	**Tutor and Mentor for middle school students** Achieving College & Career Education Program, Ypsilanti, MI, USA *Tutored and mentored low-income students at a local middle school.*
August 2018	**Graduate Instructor at MIDAS Data Science High School Summer Camp** University of Michigan, Ann Arbor, MI, USA *Introduced high school students to data science and its many applications.*
Summer 2011	**Robotics Course Volunteer Teacher** Hyde Park Primary School, Parkwood, Cape Town, South Africa *Created and taught a robotics course for Grade 6 students in a low-income community.* ****Received Volunteer of the Month Award from ProjectsAbroad: South Africa****
2008 – 2012	**Tutor and Mentor for elementary school students** Emily K. Center, Durham, NC, USA *Tutored and mentored low-income elementary school students in an after-school program.*

Honors and awards received for outreach and volunteering work:

2011   **Volunteer of the Month Award**, ProjectsAbroad: South Africa, Cape Town, South Africa

2008   **Fred Fletcher Outstanding Volunteer Project**, City of Raleigh, NC

2007   **Rank of Eagle Scout**, Boy Scouts of America

Professional Societies (year is start date)

2019   American Statistical Association (ASA)

2017   Society for Industrial and Applied Mathematics (SIAM)

2017   Institute of Electrical and Electronics Engineers (IEEE)