

## Curriculum Vitae

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<b>Contact Information</b>	<b>Longxiu Huang</b> 1512 Engineering Bldg Michigan State University East Lansing, MI, 48824 Email: <a href="mailto:huangl3@msu.edu">huangl3@msu.edu</a>
<b>Research Interest</b>	Data/Signal Processing, Applied Harmonic Analysis, Machine Learning, Random Matrix/Tensor analysis, Dynamical Sampling, Distributed Computing, Optimization, and Approximation Theory.
<b>Education</b>	<p>Ph.D. Mathematics <b>Aug. 2014 – May. 2019</b> Mathematics Department, Vanderbilt University Nashville, TN 37240, U.S.A. • Academic advisor: Akram Aldroubi • Dissertation: Dynamical Sampling and its Applications</p> <p>M.S. Mathematics <b>Sep. 2012 – Jun. 2014</b> School of Mathematical Sciences, Fudan University Yangpu District, Shanghai 200433, P. R. China</p> <p>B.S. Mathematics <b>Sep. 2009 – Jun. 2012</b> School of Mathematics and Computational Science, Sun Yat-sen University Guangzhou, Guangdong 510275, P. R. China • Bachelor thesis advisor: Yuesheng Xu &amp; Weicai Ye • Bachelor thesis: GPU-Based Parallel Implementation of the QR Decomposition Algorithm</p> <p>B.S. Software Engineering <b>Sep. 2008 – Jun. 2009</b> School of Software, Sun Yat-sen University Guangzhou, Guangdong 510275, P. R. China</p>
<b>Employment</b>	<p><b>Michigan State University</b> <b>July, 2022 –</b> <b>Assistant Professor</b> Department of Computational Mathematics, Science and Engineering Department of Mathematics</p> <p><b>University of California, Los Angeles</b> <b>July, 2019 – June, 2022</b> <b>Assistant Adjunct Professor (non-tenure-track)</b> • Mentor: Deanna Needell</p> <p><b>CAM UCLA RUE Academic Mentor</b> <b>Summer 2021</b> Worked with 4 undergraduae students on topic modeling for CIP data PI Deanna Needell</p>
<b>Honors and Awards</b>	<p>[1] AMS - Simons Foundation Travel Grant (\$5,000 award) Two year travel grant awarded to young researchers, 2021 - 2023</p> <p>[2] Bjarni Jónsson Prize for Research (Vanderbilt University) <b>2019</b></p> <p>[3] AWM travel award for AWM Research Symposium 2019 (\$625) <b>April</b></p>
<b>Publications and Preprints</b>	

## Preprints

- [1] L. Huang, X. Li, and D. Needell, "Adversarial learning in distributed systems," Submitted.
- [2] K. Henneberger, L. Huang, and J. Qin "Fast Hyperspectral Band Selection Based on Matrix CUR Decomposition," Submitted.
- [3] L. Huang, J. Qin, "Fast Dual-Graph Regularized Background Foreground Separation", Submitted.
- [4] H.Q. Cai, Z. Chao, L. Huang, and D. Needell, "Robust Tensor CUR: Rapid Low-Tucker-Rank Tensor Recovery with Sparse Corruptions," Submitted.
- [5] L. Huang, D. Needell, and S. Tang, "Robust Recovery of Bandlimited Graph Signals via Random Dynamical Sampling," Submitted.
- [6] A. Aldroubi, L. Huang, K. Kornelson, and I. Krishtal, "Predictive Algorithms in Dynamical Sampling for Burst-like Forcing Terms," Submitted to Applied and Computational Harmonic Analysis with minor revision.

## Journal Articles

- [1] H.Q. Cai, L. Huang, P. Li and D. Needell, "Matrix Completion with Cross-Concentrated Sampling: Bridging Uniform Sampling and CUR Sampling," *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2023.
- [2] L. Huang, B. Sun, M. Wang, T. Wang, Wen Zhang, and Yusi Zhang, "On A Planar Six-Neighbor Theorem and its Application," Accepted in *Journal of Mathematical Analysis and Applications*.
- [3] P. Li, C. Tseng, Y. Zheng, J. A. Chew, L. Huang, B. Jarman, D. Needell, "Guided Semi-Supervised Non-negative Matrix Factorization on Legal Documents," *Algorithms*, vol. 15, num. 5, pp. 136, 2022.
- [4] H.Q. Cai, K., Hamm, L. Huang, and D. Needell, "Robust CUR Decomposition: Theory and Imaging Applications," *SIAM Journal on Imaging Sciences (SIIMS)*, Vol.14, No.4(2021), 1472-1503.
- [5] H.Q. Cai, K., Hamm, L. Huang, and D. Needell, "Mode-wise Tensor Decompositions: Multi-dimensional Generalizations of CUR Decompositions," *Journal of Machine Learning Research (JMLR)*, Vol. 22, No.185(2021), 1-36.
- [6] A. Aldroubi, K. Gröchenig, L. Huang, P. Jaming, I. Krishtal, and J. Romero, "Sampling the Flow of a Bandlimited Function," *The Journal of Geometric Analysis*, Vol.31(2021), 9241-9275.
- [7] Z. Chao, L. Huang, and D. Needell, "HOSVD-based Algorithm for Weighted Tensor Completion," *Journal of Imaging*, Vol.7, No.7(2021), 110.
- [8] H.Q. Cai, K., Hamm, L. Huang, J.Q. Li, and T. Wang, "Rapid Robust Principal Component Analysis: CUR Accelerated Inexact Low Rank Estimation," *IEEE Signal Processing Letters*, Vol. 28 (2021), 116-120.
- [9] K. Hamm and L. Huang, "Perturbations of CUR Decompositions," *SIAM Journal on Matrix Analysis and Applications (SIMAX)*, Vol.42, No.1 (2021), 351-375.
- [10] K. Hamm and L. Huang, "Stability of Sampling for CUR Decompositions," *Foundations of Data Science*, Vol. 2, No. 2 (2020), 83-99.
- [11] K. Hamm and L. Huang, "Perspectives on CUR Decompositions," *Applied and Computational Harmonic Analysis (ACHA)*, Vol. 48, No. 3 (2020), 1088-1099.

- [12] A. Aldroubi, L. Huang, and A. Petrosyan, "Frames induced by the action of continuous powers of an operator," *Journal of Mathematical Analysis and Applications*, Vol.478, No.2 (2019), pp.1059-1084.
- [13] A. Aldroubi, L. Huang, I. Krishtal, R. Lederman, A. Ledeczi, and P. Volgyesi, "Dynamical sampling with additive random noise," *Sampling Theory in Signal and Image Processing*, Vol.17, No.2 (2018), pp.153-182.
- [14] L. Huang and T. Wang, "On the number of neighbors in normal tiling," *SIAM Journal of Discrete Mathematics*, Vol. 31, Issue 1 (2017), pp. 240-253.

## Conference Publications

- [1] Z. Tan, L. Huang, H.Q. Cai, Y. Lou, "Non-convex approaches for low-rank tensor completion under tubal sampling", IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2023.
- [2] Q. Yao, L. Huang, S. Tang "Space-time Variable Density Samplings for Sparse Bandlimited Graph Signals Driven by Diffusion Operators", IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2023.
- [3] X. Li, L. Huang, and D. Needell."Distributed randomized Kaczmarz for adversarial workers," Proc. 53rd Asilomar Conf. on Signals, Systems and Computers, Pacific Grove, CA, November, 2021.
- [4] H.Q. Cai, Z. Chao, L. Huang, D. Needell, "Fast Robust Tensor Principal Component Analysis via Fiber CUR Decomposition," IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, 2021.
- [5] R. Grotheer, K. Ha, L. Huang, Y. Huang, A. Kryshchenko, O. Kryshchenko, P. Li, X. Li, D. Needell, E. Rebrova, "COVID-19 Literature Topic-Based Search via Hierarchical NMF," EMNLP 2020 Workshop NLP-COVID
- [6] Z. Chao, L. Huang, and D. Needell, "Tensor Completion through Total Variation with Initialization from Weighted HOSVD," Proc. Information Theory and Applications (ITA 2020), San Diego, CA, February.
- [7] A. Aldroubi, L. Huang, K. Kornelson, and I. Krishtal, "Dynamical Sampling with a Burst-like Forcing Term," 13th International Conference on Sampling Theory and Applications (SampTA 2019), Bordeaux, France.
- [8] K. Hamm and L. Huang, "On Column-Row Matrix Approximations," 13th International Conference on Sampling Theory and Applications (SampTA 2019), Bordeaux, France.
- [9] A. Aldroubi, L. Huang, I. Krishtal, and R. Lederman, "Dynamical sampling with random noise," *2017 International Conference on Sampling Theory and Applications (SampTA)*, Tallin, Estonia, 2017, pp.409-412.

## Poster

"Numerical testing for Dynamical Sampling," *Workshop on Recent Developments on Mathematical/Statistical approaches in DATA Science (MSDAS)*, June, 2019

"Numerical testing for Dynamical Sampling," *February Fourier Talks 2018*, February, 2018

"Expected Precision and Bias of  $T_1$  and  $T_2$  Relaxation Rates Derived from Magnetic Resonance Fingerprinting," *The Conference of the Frontiers of Biomedical Imaging Science VI*, May, 2017

## Talk

- [1] “Smooth Graph Signal Recovery from Randomized Space-time Samples,” Colloquium talk in Mathematics, Northern Illinois University, Feb 17, 2023.
- [2] “CUR Decompositions and their Applications,” Seminar talk in Applied Mathematics, Zhejiang University of Technology, online, December 12, 2022.
- [3] “Robust Estimation of Smooth Graph Signals from Randomized Space-time Samples,” Seminar talk in Applied Mathematics, University of Kentucky, November 17, 2022.
- [4] “Matrix Completion with Cross-Concentrated Sampling,” SIAM Conference on Data Science (SIAM DS22) on Randomized Methods in Large-Scale Inference and Data Problems, San Diego, CA, U.S.
- [5] “Efficient methods for robust decompositions,” SIAM Great Lakes Section Annual Meeting, Wayne State University, Detroit, MI, September 24, 2022.
- [6] “The applications of CUR decompositions: robust decompositions and data completions,” Seminar talk, Harvey Mudd College, August 2, 2022.
- [7] “Robust Tensor Decomposition,” The seventh International Conference on Continuous Optimization (ICCOPT, 2022) on Tensor Modeling and Optimization, Bethlehem, PA, July 27, 2022.
- [8] “Matrix Completion with Cross-Concentrated Sampling,” IAS WAM 2022 Program on Mathematics of Machine Learning, Institute of Advanced Study, May 26, 2022.
- [9] “Robust Decomposition Methods based on CUR Decompositions,” Workshop on Computational Harmonic Analysis and Linear Algebra, The Fields Institute, May 9 - 13, 2022.
- [10] “Robust Tensor Decomposition via Fiber CUR Decomposition,” Joint Mathematics Meetings in MSRI Special Session on Tensor Modeling and Optimization, April 9, 2022.
- [11] “The Prony-Laplace Method to Identify Burst-like Forcing Terms in Dynamic System,” Joint Mathematics Meetings in MSRI Special Session on Frame Theory and Applications I, April 7, 2022.
- [12] “Low-rank Structured Data Analysis,” Seminar talk in Applied Mathematics, University of Kentucky, online, January 13, 2022.
- [13] “Skeleton-based Algorithms for Large-scale Data Analysis,” Seminar talk in Applied Mathematics, University of California Santa Barbara, November 19, 2021.
- [14] “CUR Decompositions and their Applications,” Seminar talk in Applied Mathematics, Southeast University, Online, September 13, 2021
- [15] “CUR Decompositions and their Applications,” CodEx Seminar, Online, August 24, 2021. [\[video\]](#)
- [16] “Tensor Completion through Total Variation with Initialization from Weighted HOSVD,” Information Theory and Applications Workshop, San Diego, CA, February 3, 2020.
- [17] “CUR Decompositions and Perturbations,” Joint Mathematics Meetings, AMS Special Session on Group Actions in Harmonic Analysis, Denver, CO, January 15, 2020.
- [18] “CUR Decompositions and Perturbations,” Approximation Theory 16, Vanderbilt in Nashville, Tennessee, May 20, 2019
- [19] “Dynamical Sampling,” the AWM research symposium 2019, Rice University in Houston, Texas, April 6, 2019

- [20] “Dynamical Sampling with additive Random noise,” Second International Conference on Mathematics of Data Science, Old Dominion University in Norfolk, Virginia, Nov 4, 2018
- [21] “Dynamical Sampling in Continuous time,” Special Session on Applied Harmonic Analysis: Frame Theory and Applications, Fall Western Sectional Meeting, San Francisco, CA, October 27, 2018
- [22] “Dynamical Sampling,” Seminar talk, Georgia Institute of Technology, October 17, 2018
- [23] “On noise and unknown evolution operators in dynamical sampling,” Oak Ridge National Laboratory, July 19, 2018
- [24] “Frames Induced by the Continuous Actions of an Operator,” *7th International Conference on Computational Harmonic Analysis*, Nashville, May 15, 2018
- [25] “Frames Induced by the Action of Continuous Powers of an Operator”, *The Conference of AMS Nashville*, April 15, 2018
- [26] “Dynamical Sampling in Continuous time,” *Special Session on Applied Harmonic Analysis: Frames, Samplings, and Applications, AMS Fall Southeastern Sectional Meeting*, Orlando, FL, September 23, 2017
- [27] “Dynamical Sampling in random noise,” *12th International Conference on Sampling Theory and Applications (SampTA 2017)*, Tallinn, Estonia, July 6, 2017
- [28] Colloquium, Georgia Institute of Technology, February 2022.
- [29] Colloquium, University of Oklahoma, February 2022.
- [30] Colloquium, Michigan State University, February 2022.
- [31] Colloquium, Rensselaer Polytechnic Institute (RPI), January 2022.
- [32] Colloquium, Arizona State University, January 2022.
- [33] Colloquium, University of California, Davis, January, 2022.
- [34] Colloquium, University of Houston, December 2021.
- [35] Colloquium, University of Texas–Corpus Christi, December 2021.

**Invited Research Visit**

- [1] Northern Illinois University, Host: Professor Ilya Krishtal, September 2019

**Additional Training**

- [1] Workshop II: Mathematical Advances for Multi-Dimensional Microscopy, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, CA, **October 24 – 28, 2022.**
- [2] Broadening Participation: 2022 MPS Workshop for Young Investigators, Alexandria, VA, **June 13–14, 2022.**
- [3] 2022 Women and Mathematics Program, “The Mathematics of Machine Learning,” Princeton University and the Institute for Advance Study, **May 21-27, 2022.**
- [4] Scientific Machine Learning, ICERM Topical Workshop, Providence, RI, **January 28–30, 2019.**
- [5] Math + X Symposium on Inverse Problems and Deep Learning in Space Exploration, Rice University, **January 23–25, 2019.**
- [6] Data Sparse Approximations and Algorithms of Gene Golub SIAM Summer School, Akademie Berlin-Schmöckwitz, Germany, **May 29–June 9, 2017.**
- [7] The Eigenvalues Problems of Scientific Computational Summer School, Institute of Software, Chinese Academy of Sciences, Beijing, China, **July 22–27, 2013.**

[8] “Personal investment based on neural network algorithm”, Undergraduate Research Project of Guangdong Province Sun Yat-sen University, Supervised by Professor Peixing Li, **Sep 2010–Mar 2012**.

### **Mentoring service & leadership**

- **Mentoring four undergraduate students in CAM UCLA REU program** (summer 2021)  
topic modeling on text data for California Innocence Project (CIP)  
PI: Deanna Needell; assistant mentors: Joyce Chew, Ben Jarman.
- **Co-leading one student project** for UCLA Math 290J class (spring 2020)  
Topic: topic-based search for COVID-19 related scientific literature
- **Co-mentoring four PhD students**  
Zehan Chao (2019 - 2022), Xia Li (2020 - 2022)  
scientific advisor Deanna Needell
- **Mentoring three undergraduate students**  
Jiaqi Li (SYSU, now UCAS 2020), Pengyu Li (UCLA, 2020-2022), Shriniket Buche (UCLA, 2021-2022)

### **Teaching and grading**

- Instructor, Mathematical Modeling Math 142, 2020 Fall, 2021 Spring and Fall, 2022 Winter
- Instructor, Applied Numerical Methods Math 151B, 2021 Winter, Spring, 2022 Spring
- Instructor, Directed Research for Undergraduates Math 199, 2021 Winter
- Instructor, Introduction to Discrete Structures Math 61(141 Students), 2020 Spring
- Instructor, Linear Algebra and its Applications 33A, 2019 Fall (160 students), 2020 Winter (78 students)
- Instructor, Linear Algebra 115A, 2019 Fall, 2022 Spring
- Teaching assistant, Multivariable Calculus and Linear Algebra, 2018 Spring.
- Teaching assistant, Differential Equations with Linear Algebra, 2017 Spring.
- Teaching assistant, Accelerated Single-Variable Calculus 1300, 2016 Fall, 2017 Fall, 2018 Fall
- Teaching assistant, Accelerated Single-Variable Calculus 1301, 2016 Spring, 2019 Spring
- Grader, Introduction to Numerical Mathematics, 2015 Fall.

### **Service (Research Community)**

#### **Conference Organization**

- Co-organizer (with Xuemei Chen and Jing Qin) of the special session “Sparse signal learning and its applications in data science” at 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications to be held in Wilmington, NC USA, May 31 - June 4, 2023.

- Principle organizer for One World Mathematics of Information, Data, and Signals (1W-MINDS) Seminar, 2022 -
- Co-organizer (with Ravishankar Saiprasad, Jianliang Qian, Luciano Silvestri, and Erik Amezquita) of 2nd MSU CMSE Data Science Student Conference 2022, East Lansing, November 11, 2022
- Co-organizer(with Hanqin Cai and Sui Tang) of a Minisymposium on *Non-convex methods for matrix and tensor problems with application to data science* at 2022 SIAM Conference on Mathematics of Data Science (MDS22), Hybrid, September 2022
- Co-organizer(with Hanqin Cai and Sui Tang) of a Minisymposium on *Low-rank Structured Data Analysis: Models and Algorithms* at 2022 SIAM Annual Meeting (AN22), Hybrid, July 2022
- Co-organizer(with Hanqin Cai and Keaton Hamm) of a Minisymposium on Computational Linear Algebra in Data Science at the SIAM Conference on Computational Science and Engineering (CSE), Online, March 2021
- Co-organizer(with Hanqin Cai) of a Minisymposium on Low Rank Methods in Data Science and Machine Learning at SIAM Conference on Applied Linear Algebra (LA21), Online, May 2021

### Students Advised

- **Bowen Su**, PhD Student, coadvised with Andrew Christlieb, Math 2023-Present
- **Martina Neuman**, Postdoc, coadvised with Yuying Xie, CMSE 2022-Present
- **Arash Yunesi**, PhD Student, coadvised with Yuying Xie, CMSE 2022-Present
- **William Chettleburgh**, Undergraduate Student, MSU 2022-Present
- **Jingyue Li**, Undergraduate Student, MSU(Jilin University) 2022-Present
- **Xia Li**, PhD Student, UCLA, Math 2019-2022
- **Zehan Chao**, PhD Student, UCLA, Math 2019-2022
- **Pengyu Li**, Undergraduate Student, UCLA 2020-2022

### Committee Membership

- **Goku Bhusall**, PhD Student, Advisor: Ekaterina A Rapinchuk, Applied Mathematics, 2023-present
- **Boyao Zhu**, PhD Student, Advisor: Heiko Hergert, Physics, 2023-Present
- **Elena Wang**, PhD Student, Advisor: Elizabeth Munch, CMSE, 2022-Present
- **Arash Yunesi**, PhD Student, Advisor: Yuying Xie, CMSE/Statistics 2022-Present
- **Julian Venegas**, PhD Student, Advisor: Yuying Xie, CMSE/Statistics 2022-Present
- **Mark Roach**, PhD Student, Advisor: Mark Iwen, Math 2022-Present
- **Yuta Hozumi**, PhD Student, Advisor: Guowei Wei, Math 2022-Present

- **Azzam Alfarra**, PhD Student, Advisor: Guowei Wei, Math 2022-Present

## **Editorial Board**

- Academic Editor for PLOS ONE

## **Referee Work**

Patterns

IEEE Transactions on Information Theory

IEEE Transactions on Image Processing

SIAM Journal on Mathematics of Data Science (SIMODS)

Machine Learning

Applied and Computational Harmonic Analysis (2 times)

The Journal of “Sampling Theory, Signal Processing, and Data Analysis” (4 times)

Journal of Machine Learning Research

Numerical Linear Algebra with Applications

Linear Algebra and its Applications

Journal of Mathematical Analysis and Applications

IEEE Transactions on Knowledge and Data Engineering

Discrete and Continuous Dynamical Systems Series S

Knowledge and Information Systems

Mathematical Reviews

International Conference on Computer Vision (ICCV) Workshop 2021

The Journal of Supercomputing

SampTA Conference Proceedings

### **Programming**

Matlab, C, C++, Python, Cuda C, Julia

### **Skills**

#### **Language**

English, Chinese

#### **Skills**

#### **Membership**

Association for Women in Mathematics

Society for Industrial and Applied Mathematics