Yu Sun

Email: sunyu@caltech.edu
Homepage: sunyumark.github.io
Google Scholar: scholar.google.com/sun.yu

I will be joining the Department of Electrical and Computer Engineering at Johns Hopkins University this fall. I am looking for Ph.D. and Master students. Feel free to fill this quick form to reach out.

BIOGRAPHY

I am a post-doctoral researcher in the Department of Computing and Mathematical Sciences at California Institute of Technology (Caltech) working with **Prof. Katie Bouman**. My research focuses on developing explainable and reliable AI algorithms for scientific imaging and computer vision. Prior to Caltech, I received my Ph.D. degree from Washington University in St. Louis (Wash U) supervised by **Prof. Ulugbek S. Kamilov**. My dissertation was the winner of the **2022 Turner Ph.D. Dissertation Award**.

Research Interests: Computational Imaging, Machine Learning, Computer Vision.

EDUCATION

Washington University in St. Louis, St. Louis, MO Jan. 2018 – May. 2022
Ph.D. in Computer Science
Advisor: *Prof. Ulugbek Kamilov*

Washington University in St. Louis, St. Louis, MO Aug. 2015 – May. 2017
M.S. in Data Analytics & Statistics

Sichuan University, Chengdu, China Sep. 2011 – Jun. 2015
B.S. in Electronic and Information Engineering
Advisor: *Prof. Qinggong Guo*

WORKING EXPERIENCE

California Institute of Technology, Pasadena, CA Jul. 2022 – Present
Postdoctoral Fellow, Computing and Mathematical Sciences Department
Advisor: *Prof. Katie Bouman*

Cedars Sinai Hospital, Los Angles, CA Aug. 2022 – July 2023
Clinical Data Research Specialist
Mentor: *Dr. David Ouyang*

Nvidia, Santa Clara, CA May 2021 – Aug. 2021
Research Intern (Learning and Perception Research)
Mentor: *Dr. Orazio Gallo*

Capacity, St. Louis, MO May 2017 – Aug. 2017
Developer Intern

AWARDS

Turner Ph.D. Dissertation Award 2022
Top in the class
Department of Computer Science
Washington University in St. Louis

Student Travel Award 2019
NeurIPS

Honor (top 15%) 2019-2021
Department of Computer Science
Washington University in St. Louis

PUBLICATIONS

Pre-print: (*'∗' indicates equal contribution*)

[p 2.] Z. Wu, **Y. Sun**, Y. Chen, B. Zhang, Y. Yue, and K. L. Bouman "Principled Probabilistic Imaging using Diffusion Models as Plug-and-Play Priors." **Preprint**.

[p 1.] **Y. Sun**, Z. Wu, Y. Chen, B. T. Feng, and K. L. Bouman "Provable Probabilistic Imaging using Score-Based Generative Priors." **Preprint** arXiv:2310.10835.

Journal: (*'∗' indicates equal contribution*)

[j 15.] Z. Wu, T. Yin, **Y. Sun**, R. Frost, A. V. D. Kouwe, A. V. Dalca, and K. L. Bouman "Learning Task-Specific Strategies for Accelerated MRI." **IEEE Trans. Comput. Imag.**, in press.

[j 14.] P. Goyes-Peñafiel, E. Vargas, C. V. Correa, **Y. Sun**, U. S. Kamilov, B. Wohlberg, and H. Arguello, "Coordinate-Based Seismic Interpolation in Irregular Land Survey: A Deep Internal Learning Approach," **IEEE Trans. Geo. Rem. Sen.**, vol. 61, pp. 1-12, 2023.

[j 13.] R. Liu*, **Y. Sun***, J. Zhu, L. Tian, and U. S. Kamilov, "Recovery of Continuous 3D Refractive Index Maps from Discrete Intensity-Only Measurements using Neural Fields." **Nature Machine Intelligence**, vol. 4, pp. 781–791, 2022. **[Impact Factor = 27.2]**

[j 12.] W. Gan, **Y. Sun**, C. Eldeniz, J. Liu, H. An, and U. S. Kamilov, "Deformation-Compensated Learning for Image Reconstruction without Ground Truth," **IEEE Trans. Med. Imag.**, vol. 41, no. 9, pp. 2371-2384, 2022.

[j 11.] **Y. Sun**, J. Liu, M. Xie, B. Wohlberg, and U. S. Kamilov, "CoIL: Coordinate-based Internal Learning for Tomographic Imaging." **IEEE Trans. Comput. Imag**, vol. 7, pp. 1400-1412, 2021

[j 10.] J. Liu, **Y. Sun**, W. Gan, X. Xu, B. Wohlberg, and U. S. Kamilov, "SGD-Net: Efficient Model-Based Deep Learning with Theoretical Guarantees." **IEEE Trans. Comput. Imag.**, vol. 7, pp. 598-610, June 2021

[j 9.] **Y. Sun***, Z. Wu*, X. Xu*, B. Wohlberg, and U. S. Kamilov, "Scalable Plug-and-Play ADMM with Convergence Guarantees." **IEEE Trans. Comput. Imag.**, vol. 7, pp. 849-863, July 2021.

[j 8.] M. Torop, S. Kothapalli, **Y. Sun**, J. Liu, S. Kahali, D. A. Yablonskiy, and U. S. Kamilov, "Deep learning using a biophysical model for Robust and Accelerated Reconstruction (RoAR) of quantitative and artifact-free R2* images." **Magn. Reson. Med.**, vol. 84, pp. 2932-2942, 2020.

[j 7.] X. Xu, **Y. Sun**, J. Liu, B. Wohlberg, and U. S. Kamilov, "Provable Convergence of Plug-and-Play Priors with MMSE denoisers." **IEEE Signal Process. Lett.**, vol. 27, pp. 1280-1284, 2020.

[j 6.] G. Song, **Y. Sun**, J. Liu, and U. S. Kamilov, "A New Recurrent Plug-and-Play Prior Based on the Multiple Self-Similarity Network." **IEEE Signal Process. Lett.**, vol. 27, pp. 451-455, 2020.

[j 5.] J. Liu, **Y. Sun**, C. Eldeniz, W. Gan, H. An, and U. S. Kamilov, "RARE: Image Reconstruction using Deep Priors Learned without Ground Truth." **IEEE J. Sel. Topics Signal Process.**, vol. 14, no. 6, pp. 1088-1099, 2020.

[j 4.] Z. Wu, **Y. Sun**, A. Matlock, J. Liu, L. Tian, and U. S. Kamilov, "SIMBA: Scalable Inversion in Optical Tomography using Deep Denoising Priors." **IEEE J. Sel. Topics Signal Process.**, vol. 14, no. 6, pp. 1163-1175, 2020.

[j 3.] **Y. Sun***, J. Liu*, and U. S. Kamilov, "Block Coordinate Regularization by Denoising," **IEEE Trans. Comput. Imag.**, vol. 6, pp. 908-921, 2020.

[j 2.] **Y. Sun**, B. Wohlberg, and U. S. Kamilov, "An Online Plug-and-Play Algorithm for Regularized Image Reconstruction." **IEEE Trans. Comput. Imag.**, vol.5, no.3, pp.395-408, September 2019.

[j 1.] **Y. Sun**, Z. Xia, and U. S. Kamilov, "Efficient and accurate inversion of multiple scattering with deep learning," **Optics Express**, vol.26, no.11, pp.14678-14688, May 2018.

Conference: (*'∗' indicates equal contribution*)

[c 13.] W. Shangguan*, **Y. Sun***, W. Gan, and U. S. Kamilov, "Learning Cross-Video Neural Representations for High-Quality Frame Interpolation." European Conference on Computer Vision **(ECCV)**, Tel Aviv, Israel, October 23-27, pp. 511-528. **[Acceptance rate: 1492/5803 = 26%]**

[c 12.] M. Xie*, J. Liu*, **Y. Sun**, B. Wohlberg, U. S. Kamilov "Joint Reconstruction and Calibration using Regularization by Denoising." Proc. IEEE Int. Conf. Comp. Vis. Workshops (**ICCVW 2021**), 2021

[c 11.] J. Liu, **Y. Sun**, W. Gan, X. Xu, B. Wohlberg, and U. S. Kamilov, "Stochastic Deep Unfolding for Imaging Inverse Problems," Proc. IEEE Int. Conf. Acoustics, Speech and Signal Process (**ICASSP 2021**), Toronto, Canada, June 6-11, pp. 1395-1399.

[c 10.] **Y. Sun**, J. Liu, Y. Sun, B. Wohlberg, and U. S. Kamilov, "Async-RED: A Provably Convergent Asynchronous Block Parallel Stochastic Method using Deep Denoising Priors." International Conference on Learning Representations **(ICLR 2021)**. **[Spotlight: 114/2997 = 4%]**

[c 9.] W. Gan, **Y. Sun**, C. Eldeniz, H. An and U. S. Kamilov, "Deep Image Reconstruction using Unregistered Measurements without Groundtruth." Proc. Int. Symp. Biomedical Imaging 2021 (**ISBI 2021**), Nice, France, April 13-16, pp. 1531-1534.

[c 8.] X. Xu, J. Liu, **Y. Sun**, B. Wohlberg, and U. S. Kamilov, "Boosting the Performance of Plug-and-Play Priors via Denoiser Scaling," Proc. 54th Asilomar Conf. Signals, Systems, & Computers (**ACSSC 2020**), Pacific Grove, CA, November 1–5, pp. 1305-1312.

[c 7.] Z. Wu, **Y. Sun**, J. Liu, and U. S. Kamilov, "Online Regularization by Denoising with Application to Phase Retrival," Workshop on Learning for Computational Imaging, **ICCVW 2019**, pp. 3887-3895.

[c 6.] J. Liu, **Y. Sun**, X. Xu, and U. S. Kamilov, "Image Restoration using Total Variation Regularized Deep Image Prior," Proc. IEEE Int. Conf. Acoustics, Speech and Signal Process. (**ICASSP 2019**), pp.7715-7719.

[c 5.] J. Liu, **Y. Sun**, and U. S. Kamilov, "Infusing Learned Priors into Model-Based Multispectral Imaging," IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (**CAMSAP 2019**).

[c 4.] **Y. Sun**, J. Liu, and U. S. Kamilov, "Block Coordinate Regularization by Denoising," Proc. Ann. Conf. Neural Information Processing Systems (**NeurIPS 2019**), pp. 382–392. **[Acceptance rate: 1428/6743 = 21%]**

[c 3.] **Y. Sun**, B. Wohlberg, and U. S. Kamilov, "Plug-In Stochastic Gradient Method," Proc. International Biomedical and Astronomical Signal Processing Frontiers Workshop (**BASP 2019**), p.75.

[c 2.] **Y. Sun**, S. Xu, Y. Li, L. Tian, B. Wohlberg, and U. S. Kamilov, "Regularized Fourier Ptychography using an Online Plug-and-Play Algorithm," Proc. IEEE Int. Conf. Acoustics, Speech and Signal Process. (**ICASSP 2019**), pp.7665-7669. **[Oral]**

[c 1.] **Y. Sun** and U. S. Kamilov, "Stability of Scattering Decoder For Nonlinear Diffractive Imaging," Proc. 4th International Traveling Workshop on Interactions between Sparse models and Technology (**iTWIST 2018**), p.31. **[Oral]**

PRESENTATIONS & TALKS

Conference Presentations:

[c 6.] ICCP 2023, Madison WI, USA, July 28-30.
Topic: 'Provable Probabilistic Imaging using Score-based Generative Priors'

[c 5.] ECCV 2022 (Virtual)
Topic: 'Learning Cross-Video Neural Representations for High-Quality Frame Interpolation'

[c 4.] ICIP 2021 (Virtual)
'SIMBA: Scalable Inversion in Optical Tomography using Deep Denoising Priors'

[c 3.] ICLR 2021 (Virtual)
Topic: 'Async-RED: A Provably Convergent Asynchronous Block Parallel Stochastic Method using Deep Denoising Priors'

[c 2.] NeurIPS 2019, Vancouver, Canada, Dec. 8-14.
'Block-coordinate Regularization by Desnoising.'

[c 1.] iTWIST 2018, Marseille, France, Nov. 21-23.
'Stability of Scattering Decoder for Nonlinear Diffractive Imaging.'

Invited Talks:

[t 10.] Johns Hopkins University EE department, Mar. 2024.
Topic: 'Turning Denoisers into Principled Imaging Solvers: Algorithm, Theory, and Application'

[t 9.] Georgia Tech CSE college, Mar. 2024.
Topic: 'Turning Denoisers into Principled Imaging Solvers: Algorithm, Theory, and Application'

[t 8.] EI Computational Imaging XXII, Jan. 2024.
Topic: 'Provable Probabilistic Imaging using Score-based Generative Priors'

[t 7.] EI Implicit Neural Representations for Inverse Imaging, Jan. 2024.
Topic: 'Implicit Neural Representation for Tomographic Imaging'

[t 6.] CVPR Computational Camera and Display Workshop, June 2022.
Topic: '3D Tomographic Microscopy using Neural Fields'

[t 5.] Rice University Imaging & vision seminar, July 2022.
Topic: 'Integrating physical and learning models for computational imaging'

[t 4.] Stanford Computational Imaging Lab, Jan 2022.
Topic: 'Integrating physical and learning models for computational imaging'

[t 3.] Boston University Computational Imaging Systems Lab, Dec 2021.
Topic: 'Integrating physical and learning models for computational imaging'

[t 2.] CMU Image Science Lab, Dec 2021.
Topic: 'Integrating physical and learning models for computational imaging'

[t 1.] Caltech Computational Cameras Group, Oct 2021.
Topic: 'Integrating physical and learning models for computational imaging'

PROFESSIONAL SERVICES

- **Professional societies:**
  - IEEE Signal Processing Society, Member 2022-present
  - IEEE Signal Processing Society, Student Member 2018-2022
- **Technical committees:**
  - IEEE Technical Committee of Computational Imaging (**CI TC**), **Elected Member** 2023-present
- **Journal Editor:**

- IEEE Open Journal of Signal Processing, Consultant Associate Editor 2022-present

- **Journal Reviewer:**
  - Nature Communications (**Nat. Commun**)
  - OSA **Optica**
  - SIAM Journal on Imaging Sciences (**SIIMS**)
  - IEEE Transaction on Pattern Analysis and Machine Intelligence (**TPAMI**)
  - IEEE Journal of Selected Topics in Signal Processing (**JSTSP**)
  - IEEE Transaction on Computational Imaging (**TCI**)
  - IEEE Transaction on Signal Processing (**TSP**)
  - IEEE Transaction on Image Processing (**TIP**)
  - IEEE Signal Processing Letters (**SPL**)
  - Signal Processing (**SP**)
  - Applied Mathematics and Computation (**AMC**)
  - Digital Signal Process (**DSP**)
  - SPIE Journal on Electronic Imaging (**JEI**)

- **Conference Reviewer/PC:**
  - International Conference on Learning Representations (**ICLR**) since 2021
  - International Conference on Machine Learning (**ICML**) since 2022
  - Neural Information Processing Systems (**NeurIPS**) since 2020
  - Computer Vision and Pattern Recognition (**CVPR**) since 2022
  - International Joint Conference on Artificial Intelligence (**IJCAI**) since 2020
  - IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**) since 2020

TEACHING EXPERIENCE

As Course Teaching Assistant:

- CSE 585T Sparse Model for Imaging, Wash U. 2018 Fall.
- ESE 415 Optimization, Wash U. 2018 Spring, 2019 Spring, 2020 Spring.
- CSE 427S Cloud Computing and Big Data Application, Wash U. 2016 Fall, 2017 Spring, 2017 Fall.

SUPERVISED STUDENTS

Current Students (Co-advised with Prof. Bouman):

- Zihui Wu (Ph.D. student)
- Heriniaina Rajaoberison (Ph.D. student)

Past Students (Co-advised with Prof. Kamilov):

- Wentao Shangguan (M.S. CSE), *Now Ph.D student at Boston U.*
- Renhao Liu (B.S./M.S. CSE), *Now at Google Inc.*
- Mingyang Xie (B.S. CSE, 2021), *Now Ph.D student at U. Maryland*
- Yiran Sun (M.S., 2021), *Now Ph.D student at Rice U.*
- Weijie Gan (M.S. CSE, 2020, Co-supervised with Xiaojian Xu), *Now Ph.D. student at Wash U.*
- Zihui Wu (B.S. CSE, 2020), *Now Ph.D. student at Caltech*
- Max Torop (M.S. CSE, 2020), *Now Ph.D. student at Northeastern U.*
- Shiqi Xu (M.S. ESE, 2019), *Now Ph.D. student at Duke U.*
- Jiaming Liu (M.S. ESE, 2018), *Now Ph.D. student at Wash U.*

• Zach Pewitt (M.S. ESE, 2018),	*Now at Boeing*
• Josehp Han (M.S. ESE, 2018),	*Now at Deloitte*
• Jialong Zhang (M.S. ESE, 2018),	*Now at Schlumberger*
• Fangying Zhai (M.S. ESE, 2018)	
• Chunyuan Li (M.S. CSE, 2018)	