# Yu Sun


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## BIOGRAPHY

I am a **post-doctoral researcher** in the Department of Computing and Mathematical Sciences (**CMS**) at California Institute of Technology (**Caltech**). I am a member of Computational Cameras Group led by **Prof. Katie Bouman**. My research focuses on developing novel algorithms for intelligent, data-intensive, and fast computational imaging systems. My work has been applied to several real-world applications, including tomographic microscopy (TM), computed tomography (CT), and magnetic resonance imaging (MRI). I also work on theoretical analysis of my algorithms. I received my Ph.D. degree from Washington University in St. Louis (**WashU**) supervised by **Prof. Ulugbek S. Kamilov**.

**Research Interests:** Computational Imaging, Convex/Non-convex Optimization, Machine Learning.

## 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 – Present
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

- NeurIPS 2019 Travel Award
- Honor (top 15%), Department of Computer Science, Wash U, 2019-2021

## PUBLICATIONS

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

[a 1.] R. Liu*, **Y. Sun***, J. Zhu, L. Tian, and U. S. Kamilov, "Zero-Shot Learning of Continuous 3D Refractive Index Maps from Discrete Intensity-Only Measurements." arXiv:2112.00002, **preprint**, 2021

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

[b 25.] 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)**, 2022. **[Acceptance rate: 1492/5803 = 26%]**

[b 24.] 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.**, in press.

[b 23.] 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

[b 22.] **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

[b 21.] 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

[b 20.] **Y. Sun***, Z. Wu*, X. Xu*, B. Wohlberg, and U. S. Kamilov, "Scalable Plug-and-Play ADMM with Convergence Guarantees. arXiv:1912.07087, **IEEE Trans. Comput. Imag.**, vol. 7, pp. 849-863, July 2021.

[b 19.] 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.

[b 18.] **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%]**

[b 17.] 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.

[b 16.] 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.

[b 15.] 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.

[b 14.] 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.

[b 13.] 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.

[b 12.] 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.

[b 11.] 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.

[b 10.] **Y. Sun***, J. Liu*, and U. S. Kamilov, "Block Coordinate Regularization by Denoising," **IEEE Trans. Comput. Imag.**, vol. 6, pp. 908-921, 2020.

[b 9.] 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.

[b 8.] 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.

[b 7.] 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**).

[b 6.] **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%]**

[b 5.] **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.

[b 4.] **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]

[b 3.] **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.

[b 2.] **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]

[b 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.

## PRESENTATIONS & TALKS

[c 9.] Invited speaker at CVPR CCD Workshop, June 2022.

[c 8.] Invited talk at Stanford Computational Imaging Lab, Jan 2022.

[c 7.] invited talk at Boston University Computational Imaging Systems Lab, Dec 2021.

[c 6.] Invited talk on at CMU Image Science Lab, Dec 2021.

[c 5.] Invited talk at Caltech Computational Cameras Group, Oct 2021

[c 4.] "SIMBA: Scalable Inversion in Optical Tomography using Deep Denoising Priors." Virtual, ICIP 2021.

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

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

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

## PROFESSIONAL SERVICES

- **Professional societies:** IEEE Signal Processing Society, Student Member (2018-present)
- **Consultant Associate Editor:** IEEE Open Journal of Signal Processing (2022-present).

- **Journal Reviewer:** OSA **Optica**, SIAM Journal on Imaging Sciences (**SIIMS**), 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**), Signal Processing (**SP**), Applied Mathematics and Computation (**AMC**), IEEE Signal Processing Letters (**SPL**), Digital Signal Process (**DSP**), SPIE Journal on Electronic Imaging (**JEI**).
- **Conference Reviewer/PC:** International Conference on Learning Representations (**ICLR**), International Conference on Machine Learning (**ICML**), Neural Information Processing Systems (**NeurIPS**), International Joint Conference on Artificial Intelligence (**IJCAI**), IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**).

## TEACHING SERVICE

**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

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

- Yuyang Hu (M.S. ESE, Co-supervised with Weijie Gan), *Now Ph.D student at Wash U.*
- 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), *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)