# Mingjie Gao

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## EDUCATION

**Ph.D. in Electrical and Computer Engineering**, University of Michigan, Ann Arbor, MI                 Dec 2023
Thesis: Advances in Image Reconstruction for Digital Breast Tomosynthesis
Advisors: Prof. Jeffrey A. Fessler, Prof. Heang-Ping Chan

**M.S. in Electrical and Computer Engineering**, University of Michigan, Ann Arbor, MI                 Dec 2020
GPA: 4.00 / 4.00
Selected Coursework: Probability and Random Processes, Matrix Methods & Statistical Methods & Optimization Methods for Signal & Image Processing, Machine Learning, Deep Learning for Computer Vision, Nonlinear Programming, Medical Imaging Systems

**B.S.E. in Electrical Engineering**, University of Michigan, Ann Arbor, MI                 Apr 2018
GPA: 3.99 / 4.00

**B.S. in Electrical and Computer Engineering**, Shanghai Jiao Tong University, Shanghai, China                 Aug 2018
UM-SJTU Joint Institute Dual Degree Program
GPA: 3.80 / 4.00

## EXPERIENCE

**Graduate Student Research Assistant**, University of Michigan, Ann Arbor, MI                 Sep 2018 - Dec 2023
Advisors: Prof. Jeffrey A. Fessler, Prof. Heang-Ping Chan
- Built a deep convolutional neural network (DCNN) and trained it with generative adversarial network (GAN) for digital breast tomosynthesis (DBT) image denoising. Improved the detectability index of microcalcifications.
- Designed a DCNN model observer for image quality assessment based on the task of microcalcification detection.
- Integrated DCNN denoising into iterative DBT reconstruction with detector blur and correlated noise modeling. Improved the model observer detection AUC.
- Modeled the x-ray source motion blur of DBT imaging system and developed an image deblurring method with a diffusion prior. Improved the image resolution.

**Summer Intern**, Apple Inc., Cupertino, CA                 May 2022 - Aug 2022
Mentors: Farhan Baqai, Hao Sun
- Worked on low-light image denoising in the Camera Algorithms team.
- Selected to present to Craig Federighi, Apple's senior vice president of Software Engineering.

**Undergraduate Student Research Assistant**, University of Michigan, Ann Arbor, MI                 May 2017 - Feb 2018
Mentors: Prof. Jeffrey A. Fessler, Gopal Nataraj
- Applied kernel ridge regression for parameter estimation from low-rank MRI data.

## JOURNAL PUBLICATIONS

1. **M. Gao**, J. A. Fessler, and H.-P. Chan, "Model-based deep CNN-regularized reconstruction for digital breast tomosynthesis with a task-based CNN image assessment approach," *Physics in Medicine and Biology*, vol. 68, no. 24, p. 245024, Dec 2023, DOI: 10.1088/1361-6560/ad0eb4.
2. H.-P. Chan, M. A. Helvie, **M. Gao**, L. M. Hadjiyski, C. Zhou, K. Garver, K. A. Klein, C. McLaughlin, R. Oudsema, W. T. Rahman, and M. A. Roubidoux, "Deep learning denoising of digital breast tomosynthesis: Observer performance study of the effect on detection of microcalcifications in breast phantom images," *Medical Physics*, vol. 50, no. 10, pp. 6177-6189, Oct 2023, DOI: 10.1002/mp.16439.
3. **M. Gao**, J. A. Fessler, and H.-P. Chan, "Deep convolutional neural network with adversarial training for denoising digital breast tomosynthesis images," *IEEE Transactions on Medical Imaging*, vol. 40, no. 7, pp. 1805-1816, Jul 2021, DOI: 10.1109/TMI.2021.3066896.

## MANUSCRIPTS & PREPRINTS

1. **M. Gao**, J. A. Fessler, and H.-P. Chan, "X-ray source blur modeling for digital breast tomosynthesis," Dec 2023, submitted.
2. G. Nataraj, J.-F. Nielsen, **M. Gao**, and J. A. Fessler, "Fast, precise myelin water quantification using DESS MRI and kernel learning," Sep 2018, on arXiv: 1809.08908.

## CONFERENCE PROCEEDINGS & ABSTRACTS

1. **M. Gao**, M. A. Helvie, R. K. Samala, L. M. Hadjiyski, J. A. Fessler, and H.-P. Chan, "Deep CNN task-based image quality assessment: Application to digital breast tomosynthesis reconstruction and denoising," in *Proc. of SPIE*, 12463, 1246319, 2023, DOI: 10.1117/12.2655419. *(Oral)*
2. **M. Gao**, M. A. Helvie, R. K. Samala, J. A. Fessler, and H.-P. Chan, "Deep learning denoising and assessment of detectability of microcalcifications in digital breast tomosynthesis: A task-based image evaluation approach using CNN," in *RSNA Annual Meeting*, Chicago, 2022. *(Poster)*
3. **M. Gao**, J. A. Fessler, and H.-P. Chan, "Deep convolutional neural network regularized digital breast tomosynthesis reconstruction with detector blur and correlated noise modeling," in *Proc. of SPIE*, 12031, 1203108, 2022, DOI: 10.1117/12.2611933. *(Oral)*
4. **M. Gao**, J. A. Fessler, and H.-P. Chan, "Plug-and-play reconstruction with deep learning denoising for improving detectability of microcalcifications in digital breast tomosynthesis images," in *RSNA Annual Meeting*, Chicago, 2021. *(Oral)*
5. **M. Gao**, J. A. Fessler, and H.-P. Chan, "Digital breast tomosynthesis denoising using deep convolutional neural network: Effects of dose level of training target images," in *Proc. of SPIE*, 11595, 115951K, 2021, DOI: 10.1117/12.2580900. *(Oral)*
6. **M. Gao**, J. A. Fessler, and H.-P. Chan, "Training deep convolutional neural network with *in silico* data for denoising digital breast tomosynthesis images," in *RSNA Annual Meeting*, virtual, 2020. *(Oral)*
7. **M. Gao**, R. K. Samala, J. A. Fessler, and H.-P. Chan, "Deep convolutional neural network denoising for digital breast tomosynthesis reconstruction," in *Proc. of SPIE*, 11312, 113120Q, 2020, DOI: 10.1117/12.2549361. *(Oral)*
8. S. T. Whitaker, G. Nataraj, **M. Gao**, J.-F. Nielsen, and J. A. Fessler. "Myelin water fraction estimation using small-tip fast recovery MRI," in *ISMRM Annual Conf.*, Montréal, 2019.
9. G. Nataraj, **M. Gao**, J.-F. Nielsen, and J. A. Fessler, "Kernel regression for fast myelin water imaging," in *ISMRM Workshop on Machine Learning Part II*, Washington D.C., 2018. (2nd-place poster award)
10. G. Nataraj, **M. Gao**, J. Assländer, C. Scott, and J. A. Fessler, "Shallow learning with kernels for dictionary-free magnetic resonance fingerprinting," in *ISMRM Workshop on MR Fingerprinting*, Cleveland, 2017.

## PROFESSIONAL SKILLS

Python (PyTorch, TensorFlow, Keras), MATLAB, C/C++, Julia, Linux

## PROFESSIONAL SERVICE

- Journal Reviews: Medical Physics, The British Journal of Radiology, Scientific Reports, Physica Medica, Machine Learning: Science and Technology
- Conference Reviews: IEEE International Symposium on Biomedical Imaging

## AWARDS & SCHOLARSHIPS

Rackham Conference Travel Grant, UM. 2019 - 2023.
Distinguished Reviewer, Medical Physics, 2021.
Outstanding Graduate, SJTU. Jun 2018.
Dean's list, UM. 2016 - 2018.
Member of Eta Kappa Nu honor society, UM EECS. Apr 2017.
The Cheng Family Scholarship, SJTU JI. Aug 2016.
Dean's list, SJTU JI. 2014 - 2016.
Excellent Academic Scholarship, SJTU. 2014 - 2016.
Bronze medal, the University Physics Competition. Jan 2016.