

Bochao Li

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As a Biomedical and Electrical Engineering PhD candidate specializing in magnetic resonance imaging (MRI) development, I possess a robust foundation in the convergence of signal processing, medical physics, and programming. Actively engaged in cutting-edge research, I am proficient in Matlab, C++, and Python. My commitment extends to advancing the broader healthcare field through the effective utilization of imaging technology.

EDUCATION

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| Ph.D. in Biomedical Engineering , University of Southern California, GPA: 3.87/4 | 2019 - present |
| M.Sc. in Bioengineering , University of California, San Diego, GPA: 3.58/4 | 2017 - 2019 |
| B.Eng. in Biomedical Engineering , Northeastern University, China, GPA: 3.88/4 | 2013 - 2017 |

SKILLS AND INTERESTS

Interests: Medical Imaging, MR Imaging, Digital Signal and Image Processing, MRI Sequence Programming
Skills: Matlab, C++, Python, Siemens IDEA, Pulseq, R Language, Latex, Machine Learning (PyTorch, TensorFlow), Multidisciplinary teamwork, ITK-SNAP, AFNI,

EXPERIENCE

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| Research Assistant | August 2019 - present |
| <i>Magnetic Resonance Engineering Laboratory, University of Southern California</i> | <i>Supervisor: Dr. Krishna Nayak</i> |

Metal MR Imaging at 0.55T:

- Developed 2D and 3D techniques to achieve higher SNR and spatial resolution near metal orthopedic implants using TSE and SPACE.
- Developed spectrally-encoded multi-spectral imaging, including sequence (RF pulse and gradients) and reconstruction algorithms (parallel imaging and compressed sensing) for processing temporal-spectral-spatial data, effectively mitigating artifacts induced by metal implants.
- Designed and optimized scan protocols to strike a balance among multiple imaging quality factors for more than 50 metallic-implant patients to align with the clinical needs of radiologists.

Measurement of transverse relaxation rates in lung parenchyma at 0.55T:

- Developed and optimized a single-sequence method, enabling joint estimation of T2, T2', and off-resonance in lung in-vivo subjects.
- Demonstrated a simulation framework utilizing the digital XCAT phantom to assess transverse relaxation rates, offering insights into the impact of respiration stages and anatomical sources.

Motion artifacts correction on DCE-MRI:

- Simulated rigid head motion on the BrainWeb dataset with a Golden-angle Cartesian Randomized sampling pattern, implemented PROPELLER, and analyzed its correction effect on various frequency motions.

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| Graduate Research Assistant | July 2018 - June 2019 |
| <i>Center of Functional MRI, UC San Diego</i> | <i>Supervisor: Dr. Thomas Liu</i> |

Optimization of rest-state Multi-echo fMRI:

- Optimized rest-state multi-echo fMRI by introducing a novel weighted combination method, enhancing temporal Signal-to-Noise Ratio and Contrast-to-Noise Ratio, and provided a clear geometric insight into the relationship between SNR and CNR metrics and their weight dependence.

Quality Assurance Routine:

- Optimized the pipeline for visualizing and analyzing fMRI and EEG data on GE scanners.
- Conducted regular QA tests to ensure the proper functioning of scanners and peripheral equipment.
- Performed fMRI data acquisition and quality assessments during daily imaging sessions.

Graduate Student Researcher

Contijoch Research Laboratory, UC San Diego

October 2017 - May 2018

Supervisor: Dr. Francisco Contijoch

Exercise Cardiac MRI in Fontan Patients:

- Quantified blood flow using 2D phase contrast images and analyzed the relationship between cardiac function and other clinic assessments.

Research And Development Internship

United Imaging Healthcare, North America, Houston, TX

May 2024 - August 2024

Development of MRI sequence and Reconstruction

- Implement iterative reconstruction to obtain motion-resolved high-resolution pulmonary imaging.
- Evaluate existing MRI pulse sequence performance and test alternative methods to accelerate transient state in bSSFP.
- Demonstrate the effectiveness and accuracy of the proposed methods and algorithms using proper quantitative metrics, phantom study, and human scans.

Software Engineering Internship

Neusoft Medical Systems Co., Ltd., China

May 2016 - September 2016

Development of image processing and management system

- Optimized pipeline performance, and functions for CT image post-processing with automatic detection of lung nodules and pulmonary shadow.

Data Analyst Intern

Academy of Agriculture and Forestry Sciences, China

January 2016 - March 2016

Analysis of secondary metabolites of upland cotton

- Designed a pipeline to analyze cotton secondary metabolite mass spectrometry data, comparing it with a metabolite database, improving the overall project's time efficiency by reducing manual comparison time by one month.

Teaching Assistant

Viterbi School of Engineering, University of Southern California

Course: Statistical Methods in Biomedical Engineering, Biomedical Computer Simulation Methods

- Facilitated and led discussion sessions, providing clarification and reinforcing key concepts.
- Developed and graded writing assignments, quizzes, and exams, providing constructive feedback.
- Designed and implemented programming experiments to strengthen student's problem-solving skills.
- Supported students' academics with a supportive learning environment and provided personalized guidance.

JOURNAL PUBLICATIONS

B Li, NG Lee, D Yoon, K Keskin, AR Toews, J Acharya, J Gross, BA Hargreaves, KS Nayak. "Distortion correction in TSE near metal implants at 0.55T using a model-based reconstruction with a reversed frequency-encoding approach." (In Preparation).

K Keskin, SX Cui, **B Li**, J Gross, J Acharya, Z Buser, J Lieberman, BA Hargreaves, KS Nayak. "Imaging Near Titanium Total Hip Arthroplasty at 0.55T Compared with 3T." *Magnetic Resonance in Medicine*. 10.1002/mrm.30438.

ISMRM Reproducible Research Study Group and the ISMRM Quantitative MR Study Group. "Repeat it without me: Crowdsourcing the T1 mapping common ground via the ISMRM reproducibility challenge." *Magnetic Resonance in Medicine*, 92(3), 1115–1127. <https://doi.org/10.1002/mrm.30111>.

B Li, NG Lee, SX Cui, KS Nayak. "Lung parenchyma transverse relaxation rates at 0.55 T." *Magnetic Resonance in Medicine*. 2022;10.1002/mrm.29541.

TT Liu, **B Li**, B Fernandez, S Banerjee. "A geometric view of signal sensitivity metrics in multi-echo fMRI." *Neuroimage*. 2022;259:119409.

F Contijoch, **B Li**, W Yang, et al. “Exercise MRI highlights heterogeneity in cardiovascular mechanics among patients with Fontan circulation: proposed protocol for routine evaluation.” *J Thorac Dis.* 2020;12(3):1204-1212.

CONFERENCE PUBLICATIONS

B Li, NG Lee, D Yoon, K Keskin, AR Toews, J Acharya, J Gross, BA Hargreaves, KS Nayak. “Distortion Correction in TSE Near Metal Implants at 0.55T Using Model-Based Iterative Reconstruction and Opposite Readout Acquisition” (Oral) Proc. ISMRM 33rd Scientific Session, Honolulu, Hawaii, USA, May 2025. ISMRM merit award: Magna Cum Laude

B Li, Qi Liu, Hongyi Gu, Hongyu Li, Jian Xu, Zheng Zhong. “Free-breathing High Quality Pulmometry MRI: 3D Cones Acquisition with Motion Compensation”, Proc. ISMRM 33rd Scientific Session, Honolulu, Hawaii, USA, May 2024.

B Li, K Keskin, D Yoon, NG Lee, BA Hargreaves, KS Nayak. “Towards to practical SESMI at 0.55T”, Proc. ISMRM 32nd Scientific Session, Singapore, May 2024.

Keskin K, Cui S, **B Li**, Gross GS, Hargreaves B, Nayak KS. “Imaging Near Metallic Implants: Initial 0.55T vs. 3T MRI Comparison in Hip Implant Patients”, Proc. ISMRM 32nd Scientific Session, Singapore, May 2024.

Barlas B, **B Li**, Keskin K, Hargreaves B, Nayak KS. “Evaluation of Accelerated SEMAC at 0.55T using Hexagonal Sampling and Parallel Imaging”, Proc. ISMRM 32nd Scientific Session, Singapore, May 2024.

B Li, Keskin K, Yoon D, NG Lee, Hargreaves B, Nayak KS. “Spectrally-encoded multi-spectral imaging (SEMSI) at 0.55T provides improved imaging adjacent to metallic implants”, Proc. ISMRM 31th Scientific Session, Toronto, May 2023.

B Li, NG Lee, Nayak KS. “Estimation of Lung Parenchyma Transverse Relaxation Rates at 0.55 T”, Proc. ISMRM 30th Scientific Session, London, May 2022.

B Li, NG Lee, Cui XS, Nayak KS. “Estimation of Lung Parenchyma Transverse Relaxation Rates at 0.55 Tesla” ISMRM Workshop on Low Field MRI, Virtual, March 2022.

B Li, NG Lee, Nayak KS. “Simulation of Lung Parenchyma MRI and Field-Strength Dependence”. Proc. ISMRM 29th Scientific Session, Online, May 2021.

Liu TT, **B Li**, Chen C, Fernandez B, Yang B, Banerjee S. “Temporal SNR in multiecho fMRI and its dependence on the choice of weights”. Proc. ISMRM 28th Scientific Session, Online, August 2020.

Li S, **B Li**, Zhou H, Niu L, Lu X, Guo Q, Ma P, Ma Z. “Differential analysis of secondary metabolites of upland cotton line 91079-80 under the stress of *Verticillium dahliae*”, IS-MPMI VXIII Congress, Scotland, 2019.