

# Rodrigo A. Lobos

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Website: <https://ralobos.github.io>

## RESEARCH EXPERIENCE

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**University of Michigan**, Ann Arbor, MI

January 2023 - Present

Postdoctoral Associate

- Supervisors: Jeffrey Fessler, Ph.D., Douglas Noll, Ph.D., Zhongming Liu, Ph.D.

**University of Southern California (USC)**, Los Angeles, CA

August 2015 - December 2022

Research Assistant

- Supervisor: Justin Haldar, Ph.D.

## EDUCATION

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**University of Southern California (USC)**, Los Angeles, CA

December 2022

Ph.D., Electrical Engineering

- Dissertation: *New theory and methods for accelerated MRI reconstruction*
- Advisor: Professor Justin P. Haldar

**University of Southern California (USC)**, Los Angeles, CA

December 2020

M.A., Applied Mathematics

**Universidad de Chile**, Santiago, Chile

July 2015

M.Sc., Electrical Engineering

- Thesis: *Application of signal processing tools in natural rock textures characterization and astrometry*
- Advisor: Professor Jorge F. Silva

**Universidad de Chile**, Santiago, Chile

July 2013

Electrical engineering professional title

(Equivalent to B.Sc. and M.Sc. in Electrical Engineering)

## RESEARCH INTERESTS

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Computational imaging; Inverse problems; Machine learning; Statistical signal and image processing; MRI reconstruction; Tomographic reconstruction; Biomedical imaging

## CONFERENCE PAPER AWARDS

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**Best Paper Award Finalist**

2020

IEEE International Symposium on Biomedical Imaging (ISBI)

*11 papers were selected out of 747 submissions*

**Summa Cum Laude Abstract Award (top 3%)**

2017

International Society for Magnetic Resonance in Medicine

*Featured with a Power Pitch presentation (hand-selected as one of the 220 most interesting abstracts out of 6,780 submissions to the conference)*

## GRADUATE SCHOOL AWARDS AND FELLOWSHIPS

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**Selected as a Ming Hsieh Institute Ph.D. Scholar**

2021

University of Southern California

<b>Best Teaching Assistant Recognition Award</b> University of Southern California	2021
<b>Best Master's Thesis in Electrical Engineering</b> Universidad de Chile	2015
<b>Outstanding Graduate Student Award</b> Award given by The School of Engineers of Chile. <i>Best graduated student in Electrical Engineering at Universidad de Chile in 2015</i>	2015
<b>Master's Degree Fellowship</b> Given by CONICYT-Chile (National Commission for Scientific and Technological Research)	2013

## JOURNAL PUBLICATIONS

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- [J12] D. Kim, J. Coll-Font, **R. A. Lobos**, D. Stab, J. Pang, A. Foster, T. Garrett, X. Bi, P. Speier, J. P. Haldar, C. Nguyen. "Single breath-hold CINE imaging with combined Simultaneous Multi-Slice (SMS) and Region-Optimized Virtual (ROVir) coils. ", *Magnetic Resonance in Medicine*, 2023. (In press).
- [J11] G. Ramos-Llorden, **R. A. Lobos**, T. H. Kim, Q. Tian, T. Witzel, H.-H. Lee, A. Scholz, B. Keil, A. Yendiki, B. Bilgic, J. P. Haldar, S. Y. Huang. "High-fidelity, high-spatial-resolution diffusion MRI of the ex vivo whole human brain at ultra-high gradient strength with structured low-rank EPI ghost correction. ", *NMR in Biomedicine*, 36:e4831, 2023.
- [J10] **R. A. Lobos**, J. P. Haldar. "On the Shape of Convolution Kernels in MRI Reconstruction: Rectangles versus Ellipsoids.", *Magnetic Resonance in Medicine*, vol. 87, no.6: pp. 2989-2996, 2022.
- [J9] **R. A. Lobos**, M. U. Ghani, W. C. Karl, R. M. Leahy, J. P. Haldar. "Autoregression and Structured Low-Rank Modeling of Sinogram Neighborhoods.", *IEEE Transactions on Computational Imaging*, vol. 7, no. 6: pp. 1044-1054, September, 2021
- [J8] **R. A. Lobos**, W. S. Hoge, A. Javed, C. Liao, K. Setsompop, K. S. Nayak, J. P. Haldar. "Robust Autocalibrated Structured Low-Rank EPI Ghost Correction.", *Magnetic Resonance in Medicine*, vol. 85, no.6: pp. 3404-3419, June, 2021.
- [J7] Gonzalo Díaz, Julián M. Ortiz, Jorge F. Silva, **Rodrigo A. Lobos** and Alvaro Egaña. "Variogram-Based Descriptors for Comparison and Classification of Rock Texture Images", *Mathematical Geoscience*, vol. 52, no. 4: pp. 451-476, May, 2020.
- [J6] Sebastián Espinosa, Jorge F. Silva, Rene A. Mendez, **Rodrigo Lobos** and Marcos E. Orchard. "Optimality of the maximum likelihood estimator in astrometry", *Astronomy & Astrophysics*, vol. 616, August, 2018.
- [J5] **R. A. Lobos**, T. H. Kim, W. S. Hoge, J. P. Haldar. "Navigator-free EPI Ghost Correction with Structured Low-Rank Matrix Models: New Theory and Methods.", *IEEE Transactions on Medical Imaging*, vol. 37, no. 11: pp. 2390-2402, Nov. 2018.
- [J4] **Rodrigo A. Lobos**, Jorge F. Silva, Julián M. Ortiz, Gonzalo Díaz and Alvaro Egaña., "Analysis and Classification of Natural Rock Textures based on New Transform-based Features", *Mathematical Geoscience*, vol. 48, no. 7: pp. 835-870, October, 2016.
- [J3] **Rodrigo A. Lobos**, Jorge F. Silva, Rene A. Mendez and Marcos E. Orchard. "Performance analysis of the Least-Squares estimator in astrometry", *Publications of the Astronomical Society of the Pacific (PASP)*, vol. 127: pp. 580-594, November, 2015.
- [J2] Rene Mendez, Jorge F. Silva, Rodrigo Orostica, and **Rodrigo Lobos**. "Analysis of the Cramér-Rao lower-bound in the joint estimation of astrometry and photometry", *Publications of the Astronomical Society of the Pacific (PASP)*, vol. 126, August, 2014.
- [J1] Rene Mendez, Jorge F. Silva and **Rodrigo Lobos**, "Analysis and interpretation of the Cramér-Rao lower-bound in astrometry: One dimensional case", *Publications of the Astronomical Society of the Pacific (PASP)*, vol. 125: pp. 580-594, May, 2013.

- [C10] **R. A. Lobos**, C.-C. Chan, J. P. Haldar. “New Theory and Faster Computations for Subspace-Based Sensitivity Map Estimation. ”, *International Society for Magnetic Resonance in Medicine Annual Meeting*, 2023. (Abstract). (In press).
- [C9] G. Ramos-Llorden, **R. A. Lobos**, T. H. Kim, Q. Tian, S. Tounetki, T. Witzel, B. Keil, A. Yendiki, B. Bilgic, J. P. Haldar, S. Huang. “Improved multi-shot EPI ghost correction for high gradient strength diffusion MRI using structured low-rank modeling k-space reconstruction”, *International Society for Magnetic Resonance in Medicine Annual Meeting*, 2021. (Abstract)
- [C8] D. Kim, **R. A. Lobos**, J. Coll-Font, M. van den Boomen, J. Conklin, J. Pang, D. Staeb, P. Speier, X. Bi, B. Ghoshhajra, J. P. Haldar, C. T. Nguyen. “Feasibility of single breath-hold CINE with combined Simultaneous Multi-Slice (SMS) and Region-Optimized Virtual (ROVir) coils.”, *International Society for Magnetic Resonance in Medicine Annual Meeting*, 2021. (Abstract)
  - **Recipient of a Magna Cum Laude ISMRM Merit Award.**
- [C7] **R. A. Lobos**, T. H. Kim, K. Setsompop, J. P. Haldar. “Advanced New Linear Predictive Reconstruction Methods for Simultaneous Multislice Imaging.”, *International Society for Magnetic Resonance in Medicine Annual Meeting*, Sydney, 2020. (Abstract)
- [C6] **R. A. Lobos**, R. M. Leahy, J. P. Haldar. “Autoregression and Structured Low-Rank Modeling of Sinograms.”, *IEEE International Symposium on Biomedical Imaging*, Iowa City, 2020.
  - **Best Paper Award Finalist (One of the best 11 papers out of 747 submissions).**
- [C5] **R. A. Lobos**, R. M. Leahy, J. P. Haldar. “Low-Rank Modeling of Local Sinogram Neighborhoods with Tomographic Applications.”, *Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, 2019.
- [C4] **R. A. Lobos**, J. P. Haldar. “Improving the Performance of Accelerated Image Reconstruction in K-Space: The Importance of Kernel Shape.”, *International Society for Magnetic Resonance in Medicine Annual Meeting*, Montral, 2019. (Abstract)
- [C3] **R. A. Lobos**, A. Javed, K. S. Nayak, W. S. Hoge, J. P. Haldar. “ Robust Autocalibrated LORAKS for Improved EPI Ghost Correction with Structured Low-Rank Matrix Models.”, *International Society for Magnetic Resonance in Medicine Annual Meeting*, Paris, 2018, p. 3533. (Abstract)
- [C2] **R. A. Lobos**, A. Javed, K. S. Nayak, W. S. Hoge, J. P. Haldar. “Robust Autocalibrated LORAKS for EPI Ghost Correction.”, *IEEE International Symposium on Biomedical Imaging*, Washington, DC, 2018, p. 663-666.
- [C1] **R. A. Lobos**, T. H. Kim, W. S. Hoge, J. P. Haldar. “ Navigator-free EPI ghost correction using low-rank matrix modeling: Theoretical insights and practical improvements”, *International Society for Magnetic Resonance in Medicine Annual Meeting*, Honolulu, 2017, p. 449. (Abstract)
  - **Recipient of a Summa Cum Laude ISMRM Merit Award (Featured with a Power Pitch presentation (hand-selected as one of the 220 most interesting abstracts out of 6,780 submissions to the conference)).**

## INVITED TALKS

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- [IT3] **Accelerated MRI Reconstruction Using LORAKS: Leveraging k-space Linear Predictability and Structured Low-rank Modeling to Predict Missing Samples**
  - ISMRM Workshop on MRI Acquisition & Reconstruction, Virtual Event, September, 2021
- [IT2] **Low-Rank Modeling of Local Sinogram Neighborhoods with Tomographic Applications**
  - Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, , November, 2019
- [IT1] **Achievability of the Cramér-Rao Lower Bound in Astrometry**
  - Dynamical Astronomy in Latin-America (ADELA), Santiago, Chile, September, 2014

## TALKS

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[T2] **Autoregression and Structured Low-rank Modeling of Sinograms**

- IEEE ISBI, Iowa City, IA, April, 2020

[T1] **Robust Autocalibrated LORAKS for EPI Ghost Correction**

- IEEE ISBI, Washington, D.C., April, 2018

## TEACHING EXPERIENCE

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**University of Southern California, Los Angeles, CA**

Teaching Assistant

- EE141: Applied Linear Algebra for Engineering Fall 2022
  - Instructor of weekly discussion sessions
  - Holding office hours
- EE588: Optimization for the Information and Data Sciences Fall 2021
  - Instructor of weekly discussion sessions
  - Preparation of homework solutions
  - Holding office hours
- EE503: Probability for Electrical and Computer Engineers Spring 2021
  - Instructor of weekly discussion sessions
  - Preparation of homework solutions
  - Holding office hours
- EE141: Applied Linear Algebra for Engineering Fall 2020
  - Instructor of weekly discussion sessions
  - Holding office hours
- EE483: Introduction to Digital Signal Processing Spring 2020
  - Instructor of weekly discussion sessions
  - Holding office hours
- EE483: Introduction to Digital Signal Processing Fall 2019
  - Preparation of homework solutions
  - Holding office hours

**Universidad de Chile, Santiago, Chile**

Teaching Assistant

- EL7024: Information Theory Spring 2014
  - Guiding term projects, grading assignments, and holding office hours
- EL3005: Signals and Systems I Fall 2013
  - Guiding term projects, grading assignments, and holding office hours
- EL4003: Signals and Systems II (Estimation and Detection Theory) Spring 2013
  - Guiding term projects, grading assignments, and holding office hours

## PROFESSIONAL SERVICES

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**Reviewer**

Journals

- IEEE Transactions on Medical Imaging
- IEEE Transactions on Computational Imaging
- Magnetic Resonance in Medicine

Conferences

- IEEE International Symposium on Biomedical Imaging (ISBI)

## **MEMBERSHIPS**

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- ISMRM trainee member
- IEEE member
- IEEE Signal Processing Society student member

## **SPECIALIZATIONS**

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- Coursera Deep Learning Specialization

Spring 2021