

Eric Gibbons

CONTACT INFORMATION	Utah Center for Advanced Imaging Research University of Utah 729 Arapleen Drive Salt Lake City, Utah 84108	WWW: ekgibbons.github.io Cell: (801) 916-2620 E-mail: eric.gibbons@utah.edu E-mail: ekgibbons@gmail.com
PERSONAL	Citizenship: USA Languages: English (native), Mandarin Chinese (proficient spoken)	
RESEARCH INTERESTS	My research interests are in applied machine learning for biomedical applications. As a graduate student, my thesis focused on manipulating and modeling magnetic fields to improve the quality of diffusion MRI exams. As a post-doctoral scholar, my work has focused on applying deep learning techniques to improve the quality of both cardiac and neural MRI protocols. The scope of my work is broad and spans basic biophysics, magnetic resonance physics, RF pulse design, image processing, and deep learning.	
EDUCATION	Stanford University , Stanford, California, USA Ph.D., Bioengineering, June 2017 <ul style="list-style-type: none">• Advisor: John Pauly• Minor: Electrical Engineering• Thesis: Robust body diffusion-weighted magnetic resonance imaging M.S., Bioengineering, June 2013 <ul style="list-style-type: none">• Concentration: Medical imaging and signal processing University of Utah , Salt Lake City, Utah, USA B.S., Biomedical Engineering, May 2011 <ul style="list-style-type: none">• Concentration: Medical imaging and signal processing• Minor: Mathematics• Thesis: Correlation-based retrospective concatenation of multi-volume 3D microCT data	
AWARDS	<ul style="list-style-type: none">• NIH T32 Cardiovascular Imaging Training Grant, 2017• ISMRM Educational Stipend Award, 2013, 2014, 2015, 2016• National Science Foundation Graduate Fellowship, 2012• Stanford University School of Engineering Dean's Doctoral Diversity Fellowship, 2011• University of Utah College of Engineering Arel Berrier Scholarship, 2010• University of Utah Barry M. Goldwater Scholar Nominee, 2010• University of Utah Presidential Scholarship, 2005 - 2011• Member of Tau Beta Pi, 2009 - Present• Eagle Scout, 2003	
POSITIONS	Utah Center for Advanced Imaging Research , Salt Lake City, Utah USA <i>Postdoctoral Fellow</i> , July 2017 to Present Work with Dr. Edward DiBella to apply deep learning techniques to improve MRI acquisitions. Work includes using custom neural network architectures for cardiac MRI pulse sequence development and quantitative diffusion MRI post-processing optimization.	

Stanford University, Stanford, California USA

Graduate Research Assistant,

April 2012 to June 2017

Developed a rapid diffusion-weighted MRI sequences for pediatric imaging cases. Pulse sequence development included RF pulse design and reconstruction techniques. Work resulted in a robust protocol that is used routinely at Lucille Packard Children's Hospital at Stanford.

MedWhat, San Francisco, California USA

Consultant/Technical Advisor,

November 2015 to December 2016

Developed novel machine learning algorithms for the purposes of computer vision and natural language processing. In particular, used convolutional neural network algorithms to identify dermatological conditions and developed a robust question-answer system for questions in the medical domain.

University of Utah, Salt Lake City, Utah USA

Edward W. Hsu Research Group

December 2009 to June 2011

Worked to improve dynamic imaging resolution through higher order reconstruction. Developed cross-correlation volumetric stitching algorithm for CT volumes. Ran CT scanner as well as performed image analysis on CT volumes.

Center for Neural Interfaces

December 2008 to November 2009

Developed a neural cuff to hold Utah Slant Electrode Array in place while also providing electrical shielding. Conducted over 60 small animal (Fischer rat) surgeries to implant the device. Monitored post surgery walking behavior, explantation, and perfusions to verify biological response to cuff.

University of Utah Nanofab

July 2008 to August 2009

Specialized on environmental scanning electron microscopy. Characterized biological materials through various surface analysis tools.

PUBLICATIONS

- [1] **E. K. Gibbons**, J. Mendes, A. S. Chaudhari, and E. V. R. DiBella, "Simultaneous acquisition of 2D SMS and 3D cardiac perfusion MRI volumes using deep learning temporal interpolation," *Magnetic Resonance in Medicine*, in preparation for submission in June 2018.
- [2] **E. K. Gibbons**, K. K. Hodgson, A. S. Chaudhari, L. G. Richards, J. J. Majersik, G. Adluru, and E. V. R. DiBella, "Simultaneous cross parameter map generation from subsampled q-space imaging using deep learning," *Magnetic Resonance in Medicine*, in submission.
- [3] A. S. Chaudhari, Z. Fang, F. Kogan, J. Wood, K. J. Stevens, **E. K. Gibbons**, J. H. Lee, G. E. Gold, and B. A. Hargreaves, "Super-resolution musculoskeletal MRI using deep learning," *Magnetic Resonance in Medicine*, 2018; doi:10.1002/mrm.27178.
- [4] **E. K. Gibbons**, P. Le Roux, J. M. Pauly, and A. B. Kerr, "Slice profile effects on nCPMG SS-FSE," *Magnetic Resonance in Medicine*, vol. 79, no. 1, pp. 430–438, 2018.
- [5] **E. K. Gibbons**, P. Le Roux, S. S. Vasanawala, J. M. Pauly, and A. B. Kerr, "Robust self-calibrating nCPMG acquisition: Application to body diffusion-weighted imaging," *IEEE Transactions on Medical Imaging*, vol. 37, no. 1, pp. 200–209, 2018.
- [6] **E. K. Gibbons**, S. S. Vasanawala, J. M. Pauly, and A. B. Kerr, "Body diffusion-weighted imaging using magnetization prepared single-shot fast spin echo and

extended parallel imaging signal averaging,” *Magnetic Resonance in Medicine*, 2017; doi:10.1002/mrm.26971.

- [7] **E. K. Gibbons**, P. Le Roux, S. S. Vasanawala, J. M. Pauly, and A. B. Kerr, “Body diffusion weighted imaging using non-CPMG fast spin echo,” *IEEE Transactions on Medical Imaging*, vol. 36, no. 2, pp. 549–559, 2017.

CONFERENCE
PROCEEDINGS

- [1] A. S. Chaudhari, Z. Fang, F. Kogan, J. Wood, K. J. Stevens, **E. K. Gibbons**, J. H. Lee, G. E. Gold, and B. A. Hargreaves, “Using artificial intelligence to enhance MRI efficiency for imaging OA,” in *International Workshop on Osteoarthritis Imaging, Menton, France*, in submission.
- [2] E. V. R. DiBella, **E. K. Gibbons**, J. Mendes, Y. Tian, and G. Adluru, “Using artificial intelligence to transform cardiac MRI reconstruction methods,” in *Engineering in Medicine and Biology Society (EMBC), 2018 Annual International Conference of the IEEE*, invited.
- [3] **E. K. Gibbons**, A. S. Chaudhari, and E. V. DiBella, “Deep slice: expanding cardiac SMS coverage through deep learning slice interpolation,” in *Proceedings of International Society for Magnetic Resonance in Medicine, 26th Annual Meeting, Paris, France*, accepted.
- [4] A. S. Chaudhari, Z. Fang, F. Kogan, J. Wood, K. J. Stevens, **E. K. Gibbons**, J. H. Lee, G. E. Gold, and B. A. Hargreaves, “Enhancing MRI resolution and fully-automating tissue segmentation using deep learning,” in *Proceedings of the Nvidia GPU Technology Conference (GTC), San Jose, California, USA*, *Best poster award.
- [5] **E. K. Gibbons**, A. S. Chaudhari, and E. V. R. DiBella, “Expanding SMS coverage in cardiac perfusion MRI through deep learning for temporal interpolation,” in *Proceedings of the ISMRM Workshop on Machine Learning, Pacific Grove, California, USA*.
- [6] A. S. Chaudhari, Z. Fang, F. Kogan, J. Wood, K. J. Stevens, **E. K. Gibbons**, J. H. Lee, G. E. Gold, and B. A. Hargreaves, “Deep-learning-based super-resolution and segmentation for clinical and research musculoskeletal MRI,” in *Proceedings of the ISMRM Workshop on Machine Learning, Pacific Grove, California, USA*.
- [7] **E. K. Gibbons**, P. LeRoux, S. Vasanawala, J. M. Pauly, and A. B. Kerr, “Robust nCPMG SS-FSE with accelerated acquisition and reconstruction,” in *Proceedings of International Society for Magnetic Resonance in Medicine, 25th Annual Meeting, Honolulu, Hawaii*, 2017, p. 3514.
- [8] **E. K. Gibbons**, J. M. Pauly, and A. B. Kerr, “Slice profile effects on non-CPMG SS-FSE acquisitions,” in *Proceedings of International Society for Magnetic Resonance in Medicine, 24th Annual Meeting, Singapore, Singapore*, 2016, p. 1894.
- [9] **E. K. Gibbons**, S. S. Vasanawala, J. M. Pauly, and A. B. Kerr, “Body DWI using nCPMG FSE,” in *Proceedings of International Society for Magnetic Resonance in Medicine, 23rd Annual Meeting, Toronto, Canada*, 2015, p. 2540.
- [10] **E. K. Gibbons**, J. M. Pauly, and A. B. Kerr, “Single-shot isotropic diffusion weighting with eddy current compensation,” in *Proceedings of International Society for Magnetic Resonance in Medicine, 22nd Annual Meeting, Milan, Italy*, 2014, p. 2559.
- [11] **E. K. Gibbons**, J. M. Pauly, M. Saranathan, B. Rutt, and A. B. Kerr, “A T2-diffusion-prepared cube sequence for brain lesion detection at 7T,” in *Proceedings of International*

Society for Magnetic Resonance in Medicine, 21st Annual Meeting, Salt Lake City, Utah, USA, 2013, p. 2512.

- [12] **E. K. Gibbons**, S. J. Holdsworth, M. Aksoy, M. B. Ooi, and R. Bammer, “Analysis of ghosting artifacts for real-time motion correction using EPI,” in *Proceedings of International Society for Magnetic Resonance in Medicine, 20th Annual Meeting, Melbourne, Australia*, 2012, p. 3431.
- [13] C. Petty, **E. K. Gibbons**, R. A. Normann, and G. A. Clark, “Containment for the Utah Slanted Electrode Array,” in *5th Annual Mountain West Biomedical Engineering Conference*, 2009.

TEACHING
EXPERIENCE

Stanford University, Department of Electrical Engineering, Stanford, California

- EE102A: Signals and Systems, **Primary Instructor**, Summer 2015, Summer 2016
- EE369B: Medical Imaging Systems II, Teaching Assistant, Spring 2016
- EE102A: Signals and Systems, Teaching Assistant, Winter 2013, Winter 2014, Winter 2016
- EE369C: Medical Imaging Reconstruction, Teaching Assistant, Fall 2015

University of Utah, Department of Biomedical Engineering, Salt Lake City, Utah

- BIOEN 3900: Biosignals Analysis, Teaching Assistant, Spring 2011
- BIOEN 5101: Bioinstrumentation, Teaching Assistant, Fall 2009, Fall 2010

RELEVANT
COURSEWORK

Medical imaging systems, convolutional neural networks for visual recognition, introduction to digital communication, medical image reconstruction, RF pulse design for MRI, convex optimization, machine learning, computer vision, linear dynamical systems, digital signal processing, electromagnetics

TECHNICAL
SKILLS

Extensive imaging experience in applied deep learning, MR pulse programming, medical imaging reconstruction, and image processing.

C/C++, Python, Keras/TensorFlow, PyTorch, MATLAB, GE EPIC pulse programming, Siemens IDEA pulse programming, and HTML experience

INTERESTS

Cycling, skiing, fly fishing, backpacking, hifi stereo equipment (analog and digital media)

REFERENCES

Prof. Edward DiBella

Professor

Department of Radiology and Imaging Sciences

University of Utah

`edward.dibella@hsc.utah.edu`

(801) 585-5543

Prof. John Pauly

Reid Dennis Weaver Professor of Engineering

Department of Electrical Engineering

Stanford University

`pauly@stanford.edu`

(650) 723-4569

Prof. Dwight Nishimura

Addie and Al Macovski Professor of Engineering

Department of Electrical Engineering

Stanford University

`dwright@stanford.edu`

(650) 723-4533

Dr. Adam Kerr

Sr. Research Engineer

Department of Electrical Engineering

Stanford University

`akerr@stanford.edu`

(650) 387-0493