ZHONGNAN FANG, PhD

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Education

Stanford University - Stanford, CA, USA 2012 - 2015

Doctor of Philosophy in Electrical Engineering

Thesis: Real-time high-resolution functional magnetic resonance imaging with GPU parallel computations

University of California – Los Angeles - Los Angeles, CA, USA 2009 - 2012

Master of Science in Electrical Engineering

Zhejiang University – Hangzhou, Zhejiang, China 2005 - 2009

Bachelor of Engineering in Information and Electronic Engineering

Professional Experience

LVIS Corporation

- Data Science Lead Mar 2020 - Now
- Senior Research Scientist Oct 2015 - Mar 2020

Responsibilities:

- Lead a team of eight neuroscientists and engineers to build next-generation, cloud-based platforms for personalized epilepsy diagnosis and treatment.
- Develop and deploy production-grade, deep-learning algorithms for abnormal EEG detection and correction, together with web-based brain connectivity visualizations.
- Design deep-learning algorithms for MRI super-resolution and compressed-sensing reconstruction for high-speed image acquisition and enhanced diagnostic quality.

Awards and Honors

- Best Poster Award, NVIDIA GPU Technology Conference 2018
- Best Healthcare Poster Award, NVIDIA GPU Technology Conference 2018
- Magna Cum Laude Merit Award, The Intl. Soc. Mag. Reson. Med. (ISMRM) 2013.
- Zhejiang Province Outstanding Undergraduate Award, 2009.
- Best Undergraduate Thesis Award, Zhejiang University, 2009.

Journal Publications

2021

- **Diagnostic accuracy of quantitative multicontrast 5-minute knee MRI using prospective artificial intelligence image quality enhancement**

  Akshay Chaudhari, Murray Grissom, **Zhongnan Fang**, Bragi Sveinsson, Jin Hyung Lee, Garry Gold, Brian Hargreaves, Kathryn Stevens. American Journal of Roentgenology, 216(6), pp.1614-1625. 2021

2020

- **Utility of deep learning super-resolution in the context of osteoarthritis MRI biomarkers**

Akshay Chaudhari, Kathryn Stevens, Jeff Wood, Amit Chakraborty, Eric Gibbons, **Zhongnan Fang**, Arjun Desai, Jin Hyung Lee, Garry Gold, Brian Hargreaves. Journal of Magnetic Resonance Imaging, 51(3), pp.768-779. 2020

2018

- **Super-resolution musculoskeletal MRI using deep learning**

  Akshay Chaudhari, **Zhongnan Fang (Co-first author)**, Feliks Kogan, Jeff Wood, Kathryn Stevens, Eric Gibbons, Jin Hyung Lee, Garry Gold, Brian Hargreaves. Magnetic resonance in medicine, 80(5), pp.2139-2154. 2018.

  ✶**Top 20 Most Downloaded Papers 2018-2019 of Magnetic Resonance in Medicine**

  ✶**Editor's Pick of Magnetic Resonance in Medicine**

2016

- **Comparison of fMRI analysis methods for heterogeneous BOLD responses in block design studies**

  Jia Liu, Ben Duffy, David Bernal-Casas, **Zhongnan Fang**, Jin Hyung Lee. NeuroImage. doi: 10.1016/j.neuroimage.2016.12.045. 2016.

- **High spatial resolution compressed sensing (HSPARSE) functional magnetic resonance imaging**

  Zhongnan Fang, Nguyen Van Le, ManKin Choy, Jin Hyung Lee. Magnetic Resonance in Medicine. doi:10.1002/mrm.25854. 2016.

- **Combining optogenetic stimulation and fMRI to validate a multivariate dynamical systems model for estimating causal brain interactions**

  Srikanth Ryali, Yen-Yu Ian Shih, Tianwen Chen, John Kochalka, Daniel Albaugh, **Zhongnan Fang**, Kaustubh Supekar, Jin Hyung Lee, Vinod Menon. NeuroImage. 132:398-405. 2016.

2015

- **Frequency-selective control of cortical and subcortical networks by central thalamus**

  Jia Liu, Hyun Joo Lee, Andrew Weitz, **Zhongnan Fang**, Peter Lin, ManKin Choy, Robert Fisher, Vadim Pinskiy, Alexander Tolpygo, Partha Mitra, Nicholas Schiff, Jin Hyung Lee. eLife 4 e09215. 2015.

- **Optogenetic fMRI reveals distinct, frequency-dependent networks recruited by dorsal and intermediate hippocampus stimulations**

  Andrew Weitz, **Zhongnan Fang**, Hyun Joo Lee, Robert S Fisher, Wesley C Smith, ManKin Choy, Jia Liu, Peter Lin, Matthew Rosenberg, Jin Hyung Lee. NeuroImage. 107:229-241. 2015.

- **Optogenetic functional MRI**.

  Peter Lin, **Zhongnan Fang**, Jia Liu, Jin Hyung Lee. Journal of Visualized Experiments (JoVE). 2015.

2013

- **High-throughput optogenetic functional magnetic resonance imaging with parallel computations**

  Zhongnan Fang and Jin Hyung Lee. Journal of Neuroscience Methods 2(218):184-195. 2013.

Patents

- **Efficacy and/or treatment parameter recommendation using individual patient data and therape utic brain network maps**, Zhongnan Fang and Jin Hyung Lee. US 2019/0142338 A1, 2019.
- **Systems and methods for generating thin image slices from thick image slices**, Zhongnan Fang, Akshay Chaudhari, Jin Hyung Lee, Brian A Hargreaves. US Patent Appl. 16/979,104, 2018.
- **Synchronization devices and methods for synchronizing imaging**. Michael Madsen, **Zhongnan Fang**, Jin Hyung Lee. WO 2018/111826, 2016.
- **Compressed sensing high resolution functional magnetic resonance imaging**. Jin Hyung Lee and **Zhongnan Fang**. WO/2017/040538, 2016.
- **In vivo visualization and control of pathological changes in neural circuits**. Jin Hyung Lee and **Zhongnan Fang**. US 2020/0179717 A1, 2012.

Selected Conference Publications

- **Convolutional neural network for real-time high spatial resolution functional magnetic resonance imaging**

  Alkan Cagan, **Zhongnan Fang**, Jin Hyung Lee. Intl Soc Magn Reson Med, Montreal, 2019.

- **Evaluating the Use of Deep learning Super-Resolution for Obtaining Osteoarthritis Biomarkers**

  Akshay Chaudhari, Jeff Wood, Kathryn Stevens, Zhongnan Fang, Jin Hyung Lee, Gary Gold, and Brian Hargreaves. Intl Soc Magn Reson Med, Montreal, 2019.

- **Accurate T2 relaxometry with simultaneous high-resolution structural imaging using deep learning**

  Akshay Chaudhari, Arjun Desai, **Zhongnan Fang**, Eric Bultman, Jin Hyung Lee, Gary Gold, and Brian Hargreaves. Intl Soc Magn Reson Med, Montreal, 2019.

- **Super-resolution MRI using deep learning**

  Akshay Chaudhari, **Zhongnan Fang**, Feliks Kogan, Jeff Wood, Kathryn Stevens, Jin Hyung Lee, Gary Gold, and Brian Hargreaves. Intl Soc Magn Reson Med, Paris, 2018.

- **Deep learning super-resolution enables rapid simultaneous morphological and quantitative magnetic resonance imaging**

  Akshay Chaudhari, **Zhongnan Fang**, Jin Hyung Lee, Gary Gold, and Brian Hargreaves. Medical Image Computing and Computer Assisted Intervention Machine Learning for Medical Image Reconstruction (pp. 3-11). Springer, Cham. (2018) pre-print: arXiv:1808.04447

- **Automated knee cartilage segmentation with very limited training data: combining convolutional neural networks with transfer learning**

  Alexander Toews, **Zhongnan Fang**, Marianne Black, Jin Hyung Lee, Gary Gold, Brian Hargreaves, and Akshay Chaudhari. Intl Soc Magn Reson Med, Paris, 2018.

- **Enhancing MRI resolution and fully-automating tissue segmentation using deep learning**

  Akshay Chaudhari, **Zhongnan Fang**, Feliks Kogan, Jeff Wood, Kathryn Stevens, Jin Hyung Lee, Gary Gold, and Brian Hargreaves. NVIDIA GPU Technology Conference, San Jose, CA. 2018.

  ✶Best Poster Award, NVIDIA GTC 2018

- **HSPARSE - a compressed sensing based high spatial resolution fMRI method**

  Zhongnan Fang, Nguyen Van Le, ManKin Choy, Jin Hyung Lee. Society for Neuroscience 2015 annual meeting, Chicago, IL, USA, 449.16.

- **Dynamic control of forebrain by central thalamus**

  Jia Liu, Hyun Joo Lee, Andrew J Weitz, **Zhongnan Fang**, Peter Lin, ManKin Choy, Robert Fisher, Vadim Pinskiy, Alexander Tolpygo, Partha Mitra, Nicholas Schiff, Jin Hyung Lee. Society for Neuroscience 2015 annual meeting, Chicago, IL, USA, 449.20.

- **Comparison of fMRI analysis methods for accurate detection of heterogeneous hemodynamic responses**

  Jia Liu, **Zhongnan Fang**, David Bernal-Casas, Jin Hyung Lee. Society for Neuroscience 2015 annual meeting, Chicago, IL, USA, 449.13.

- **Optimized compressed sensing reconstruction with parallel computation for high spatial resolution functional magnetic resonance imaging**

  Zhongnan Fang, Nguyen Van Le, ManKin Choy, Jin Hyung Lee. Society for Neuroscience 2014 annual meeting, Washington D.C., USA, 184.10.

- **Whole brain dissection of central thalamic circuit function with optogenetic fMRI**

  Jia Liu, Hyun Joo Lee, Andrew J Weitz, **Zhongnan Fang**, Peter Lin, ManKin Choy, Robert Fisher, Vadim Pinskiy, Alexander Tolpygo, Partha Mitra, Nicholas Schiff, Jin Hyung Lee. Society for Neuroscience 2014 annual meeting, Washington D.C., USA, 851.10.

- **Optogenetic fMRI reveals distinct, frequency-dependent networks recruited by dorsal and intermediate hippocampus stimulations**

Andrew J Weitz, **Zhongnan Fang**, Hyun Joo Lee, Robert S Fisher, Wesley C Smith, ManKin Choy, Jia Liu, Peter Lin, Matthew Rosenberg, Jin Hyung Lee. Society for Neuroscience 2014 annual meeting, Washington D.C., USA, 851.11.

- **GPU based fast inverse Gauss-Newton motion correction method for high throughput ofMRI**

  Zhongnan Fang and Jin Hyung Lee. Proc. Intl. Soc. Mag. Reson. Med 21st annual meeting, Salt Lake City, UT, USA, 2013, p4420.

  ✶Magna Cum Laude Merit Award, ISMRM 2013

- **On-demand generation of seizures with defined network propagation pathways**

  Andrew J Weitz, **Zhongnan Fang**, Hyun Joo Lee, Robert S Fisher, Wesley C Smith, ManKin Choy, Jia Liu, Peter Lin, Matthew Rosenberg, Jin Hyung Lee. Society for Neuroscience 2013 annual meeting, San Diego, CA, USA, 336.21.

- **Brain circuit analysis with real-time optogenetic functional magnetic resonance imaging (rt-ofMRI)**

  Zhongnan Fang and Jin Hyung Lee. Proc. Intl. Soc. Mag. Reson. Med 20th annual meeting, Melbourne, Australia, 2012; p4604.

- **Compressed sensing enabled ultra-high resolution optogenetic functional MRI**

  Nguyen Van Le, Thanh Hai Nguyen, Xiaoyi Yu, **Zhongnan Fang**, Jin Hyung Lee. Proc. Intl. Soc. Mag. Reson. Med 20th annual meeting, Melbourne, Australia, 2012; p2051.

- **Real-time optogenetic functional magnetic resonance imaging (rt-ofMRI) using graphic processing unit (GPU) based parallel computation**

  Zhongnan Fang and Jin Hyung Lee. Society of neuroscience 2011 annual meeting, Washington D.C., USA, 114.05.

Media Coverage of Research

Q&A with Akshay Chaudhari, Zhongnan Fang and Brian Hargreaves. Editor's Pick in the Magnetic Resonance in Medicine journal for Nov 2018. https://blog.ismrm.org/2018/11/30/qa-with-akshay-chaudhari-zhongnan-fang-and-brian-hargreaves/

Professional Service

Reviewer, IEEE Journal of Biomedical and Health Informatics, 2021-Now
Reviewer, ETRI Journal, 2018.
Reviewer, SPIE Journal of Medical Imaging, 2017-Now
Reviewer, Neuroimage, 2016.

Skills

Programming system: Python, C++, CUDA, MATLAB, Javascript, AWS EC2/S3 management, MongoDB
Deep Learning: PyTorch, Keras, Flask & Docker Deployment
Research Experience: Medical Image & Signal Processing, Brain Connectivity Analysis with fMRI & EEG