

SUMMARY

Ph.D. candidate in the Department of Electrical Engineering and Computer Science at Massachusetts Institute of Technology interested in using optimization theory and machine learning to research and develop performant solutions to problems in artificial intelligence, inverse problems and computational sensing / imaging.

EDUCATION

Massachusetts Institute of Technology Ph.D. in Electrical Engineering and Computer Science	09/2019 - 08/2022 (Expected)
Massachusetts Institute of Technology M.Sc. in Electrical Engineering and Computer Science	09/2017 - 05/2019
University of California, Berkeley B.Sc. (Honors) in Electrical Engineering and Computer Science	09/2013 - 05/2017

EXPERIENCE

Graduate Student Advisor: Kawin Setsompop	09/17 - Present Stanford / MIT
> Researched and developed novel optimization and deep learning algorithms for efficient solving of memory-intensive and ill-conditioned linear inverse problems in computational imaging.	
> Helped implement and deploy containerized pipeline for efficient GPU-based solving of computational imaging problems in a production setting.	
> Contributed to an open source Python toolbox for optimization algorithms and signal processing.	
Undergraduate Research Assistant Advisor: Michael Lustig	09/15 - 09/17 UC Berkeley
> Contributed to an open-source C toolbox for computational imaging.	
> Developed method that leveraged noise statistics to more accurately model the underlying sensing operator for noise-optimal image recovery.	

SELECTED PROJECTS

Polynomial Preconditioning for Accelerated Convergence of Proximal Algorithms <i>Siddharth Iyer, F. Ong, K. Setsompop</i>	<i>In Proceedings Of ISMRM 2022</i>
> Proposed a generalized preconditioner using polynomials that achieved 2–4× faster convergence of iterative proximal gradient algorithms for compressed sensing applications.	
> Formulated cost function for polynomial design using first principles of proximal operators that enabled the optimized preconditioner to target slow-converging eigenvalues of the measurement matrix.	
> Implemented algorithms using SigPy and SymPy for efficient GPU processing and symbolic polynomial optimization respectively.	
SMILR - Subspace Machine Learning Reconstruction <i>Siddharth Iyer, C. Sandino, M. Yurt, X. Cao, C. Liao, S. Schauman, K. Setsompop</i>	<i>In Proceedings Of ISMRM 2022</i>
> Proposed and validated framework that uses a deep learning initialization approach to speed up a memory-intensive computational imaging problem by 16× while utilizing 30× less memory.	
> Developed a novel weighted least squares post-processing step that leveraged the sensing operator to guard against hallucinations.	
> Implemented and trained algorithms using a combination of SigPy and PyTorch.	
SURE-based Automatic Parameter Selection for ESPIRiT Calibration <i>Siddharth Iyer, F. Ong, K. Setsompop, M. Doneva, M. Lustig</i>	<i>In Publication MRM 2020</i>
> Utilized Stein's Unbiased Risk Estimate (SURE) as a proxy cost function to perform hyper-parameter optimization for near noise-optimal estimation of the underlying sensing matrix without requiring prior knowledge of the ground truth image.	
> Implemented method in the C language to efficiently calculate and search through SURE risk as a function of hyper-parameters.	

SELECTED PUBLICATIONS

- > *S. Iyer, C. Sandino, M. Yurt, X. Cao, C. Liao, S. Schauman, K. Setsompop. SMILR: Subspace Machine Learning Reconstruction. ISMRM 2022. Invited Talk.*
- > *S. Iyer, F. Ong, K. Setsompop. Polynomial Preconditioning for Accelerated Convergence of Proximal Algorithms including FISTA. ISMRM 2022.*
- > *S. Iyer, C. Liao, Q. Li, M. Manhard, A. Berman, B. Bilgic, K. Setsompop. PhysiCal: Rapid calibration scan for B_0, B_1^+ , Coil Sensitivity and Eddy current mapping. ISMRM 2020. Invited Talk. Summa Cum Laude awarded.*
- > *S. Iyer, F. Ong, K. Setsompop, M. Doneva, M. Lustig. SURE-based Automatic Parameter Selection for ESPIRiT Calibration. MRM 2020.*
- > *S. Iyer, C. Liao, Q. Li, M. Manhard, A. Berman, B. Bilgic, K. Setsompop. PhysiCal: Rapid calibration scan for B_0, B_1^+ , coil sensitivity and Eddy current mapping. ISMRM 2020. Invited Talk. Summa Cum Laude awarded.*
- > *S. Iyer, D. Polak, C. Liao, S. Cauley, B. Bilgic, K. Setsompop. Rapid, Time-Resolved Brain Imaging with Multiple Clinical Contrasts using Wave-Shuffling. ISMRM 2019. Invited Talk. Magma Cum Laude awarded.*
- > *S. Iyer, B. Bilgic, K. Setsompop. Faster Shuffling with Wave-Encoding. ISMRM 2018. Invited Talk.*
- > *S. Iyer, F. Ong, M. Lustig. Towards A Parameter Free ESPIRiT: Soft Weighting For Robust Coil Sensitivity Estimation. ISMRM 2016. Invited Talk. Summa Cum Laude awarded.*

Classes MIT: Functional Analysis, Computer Vision, Hardware for Deep Learning, Numerical Analysis, Linear Programming.

UC Berkeley: Convex Optimization, Statistical Signal Processing, Signals and Systems, Fourier Expansion and Wavelets, Probability.

Skills Python, C, L^AT_EX, Linux, NumPy, SigPy, PyTorch.