Ekin Karasan

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Education

8/2018-8/2024 **University of California, Berkeley**, Berkeley, CA
Ph.D. in Electrical Engineering and Computer Sciences GPA: 3.95/4.00

9/2014-6/2018 **Massachusetts Institute of Technology**, Cambridge, MA
B.Sc. in Electrical Engineering and Computer Science GPA: 5.0/5.0

Research Interests

My research interests lie in medical imaging and biomedical signal processing. Specifically, I work on developing novel acquisition and reconstruction algorithms as well as hardware for Magnetic Resonance Imaging (MRI).

Research Experience

8/2024- **Postdoctoral Researcher**

University of California, Berkeley
Supervisor: Prof. Michael Lustig

- *Extended our non-contrast perfusion imaging method via multiplexing to accelerate acquisition. Demonstrated multi-slice imaging to map perfusion sources at multiple locations simultaneously.*
- *Developed an approach to image slow cerebrospinal fluid (CSF) flow in the brain and presented findings at ISMRM 2025.*
- *Devised a Python-based reconstruction algorithm to obtain high-fidelity images from shorter scan times.*

8/2018-8/2024 **Ph.D. Researcher**

University of California, Berkeley
Supervisor: Prof. Michael Lustig

Displacement Spectrum Imaging: Measuring the Dynamics of Flow of Perfusion with MRI

- *Developed a method to measure blood flow and perfusion using MRI. Programmed a pulse sequence to implement this novel technique on an MRI scanner.*
- *Designed a CAD model for a flow phantom on Autodesk Fusion 360 and 3D printed the design. Conducted flow phantom and in-vivo volunteer studies to demonstrate the capabilities and versatility of this technique.*
- *Validated sensitivity and specificity by designing controlled experiments and conducting in-vivo tests on volunteers.*
- *Presented findings at Annual Meeting of the International Society of Magnetic Resonance in Medicine (ISMRM) in 2020, 2022 and 2023.*

Caterpillar Traps: Flexible Cable Traps for RF Coils in MRI Scanners

- *Constructed a novel design for cable traps used for RF coils in MRI scanners.*
- *Performed finite element analysis for design validation and optimization using HFSS. Demonstrated robustness of design to bending with benchtop experiments. Achieved improved performance compared to commercial cable traps.*
- *Presented findings at ISMRM in 2020 and 2021.*
- *Mentored and trained three undergraduate students.*

8/2017-7/2018 **Undergraduate Researcher**

SuperUROP - Advanced Undergraduate Research Opportunities Program
Research Laboratory of Electronics (RLE)
Massachusetts Institute of Technology
Supervisor: Prof. George C. Verghese

- *Contributed to a research project aiming to diagnose patients with certain respiratory diseases using data obtained through capnography.*
- *Restructured the model of the lung used previously in the project in order to capture certain characteristics of these pulmonary diseases. Implemented the revised model in MATLAB.*
- *Assessed the success of the diagnosis using data from various patients. Presented findings at the 2018 IEEE EMBC conference.*

2/2016-12/2016 **Undergraduate Researcher**

Graybiel Laboratory, McGovern Institute for Brain Research
Massachusetts Institute of Technology
Supervisor: Helen Schwerdt

- *Participated in a research project aimed to successfully record dopamine in the brain and improve the treatment for several brain disorders including Parkinson's Disease.*
- *Developed hardware that facilitates the recording of dopamine from 16 different channels.*
- *Fabricated microelectrodes that are implantable in the brain for chronic dopamine recording.*
- *Performed in-vivo surgeries on animals to test the capabilities of the fabricated microelectrodes for chronic dopamine recording.*

Work Experience

6/2023-8/2023 **Research Intern**

Merck
South San Francisco, CA

- *Performed gated lung micro-CT acquisitions on mice with various respiratory conditions.*
- *Developed a reconstruction and analysis pipeline on the micro-CT data to extract biomarkers and assess the severity of disease.*

1/2018-2/2018 **Research Intern**

Philips Healthcare
Cambridge, MA

- *Designed a GUI in MATLAB for labeling lung ultrasound images to be used to train deep learning algorithms. Analyzed and labeled lung ultrasound images.*

6/2017-8/2017 **Software Engineer Intern**

athenahealth
Watertown, MA

- *Coordinated with a team of software engineers and product managers working on automating the processing of fax documents in the electronic health record system.*
- *Developed an efficient engine in Perl that categorized fax documents into templates in real time.*
- *Designed and established an intuitive user interface using Javascript that allows a user to view and create rules for a template.*

Teaching Experience

1/2022-5/2022 **Graduate Student Instructor**

Course: EECS 16A, Designing Information Devices and Systems I

- *Course content includes introduction to linear algebra, basic circuit analysis and introduction to machine learning.*
- *Taught two hour-long discussion sections each week to reinforce students' comprehension of course material in this introductory level undergraduate course.*
- *Developed course material, homework assignments and exams. Prepared the 3 hour-long final exam for the class and graded exams.*

1/2021-5/2021 **Graduate Student Instructor**

Course: EE C225E, Principles of Magnetic Resonance Imaging

- *Graduate level course that teaches the fundamental principles of MRI.*
- *Developed two new laboratory assignments for students to gain hands-on experience on MRI scanners.*
- *Designed homework assignments that included performing simulations in MATLAB and Python.*
- *Assisted students with homework and laboratory assignments during office hours and laboratory sessions.*

Scholarly Work

Publications

E. Karasan, J. Chen, J. Maravilla, Z. Zhang, C. Liu, M. Lustig , "MR perfusion source mapping depicts venous territories and reveals perfusion modulation during neural activation." *Nature Communications*, 2025.

K. Wang, M. Doneva, J. Meineke, T. Amthor, **E. Karasan**, F. Tan, J. I. Tamir, S. X. Yu, M. Lustig, "High-fidelity direct contrast synthesis from magnetic resonance fingerprinting" *Magnetic Resonance in Medicine*, 2023.

E. Karasan, A. Hammerschmidt, V. Taracila, F. Robb, M. Lustig, "Caterpillar traps: a highly flexible, distributed system of toroidal cable traps". *Magnetic Resonance in Medicine*, 2023.

Z. Zhang, **E. Karasan**, K. Gopalan, C. Liu, M. Lustig, "DiSpect: Displacement spectrum imaging of flow and tissue perfusion using spin−labeling and stimulated echoes". *Magnetic Resonance in Medicine*, 2021.

J. I. Tamir, F. Ong, S. Anand, **E. Karasan**, K. Wang, M. Lustig. "Computational mri with physics-based constraints: Application to multicontrast and quantitative imaging". *IEEE signal processing magazine*, 2020.

H.N. Schwerdt, M.J. Kim, S. Amemori, D. Homma, T. Yoshida, H. Shimazu, H. Yerramreddy, **E. Karasan**, R. Langer, A.M. Graybiel and M. J. Cima, "Subcellular probes for neurochemical recording from multiple brain sites". *Lab on a Chip*, 2017.

Conference Proceedings

E. Karasan, M. Lustig , "Assessing slow cerebrospinal fluid flow dynamics with displacement encoded MRI.". *International Society of Magnetic Resonance in Medicine* 33^{rd} *Annual Meeting*, 2025.

E. Karasan, C. Liu, M. Lustig , "DiSpect consistently and repeatably reveals modulation and redistribution of venous blood flow caused by functional brain activation". *International Society of Magnetic Resonance in Medicine* 32^{nd} *Annual Meeting*, 2024. **(Received Summa Cum Laude award)**

A. De Goyeneche, S. Ramachandran, K. Wang, **E. Karasan**, J. Y. Cheng, S. Yu, M. Lustig , "ResoNet: Noise-Trained physics-informed MRI off-resonance correction". *Conference on Neural Information Processing Systems* 37^{th} *Annual Meeting*, 2023.

E. Karasan, J. Chen, J. Maravilla, Z. Zhang, C. Liu, M. Lustig , "Advances in post-perfusion venous territories imaging with displacement spectrum imaging (DiSpect)". *International Society of Magnetic Resonance in Medicine* 31^{st} *Annual Meeting*, 2023.**(Received Magna Cum Laude award)**

E. Karasan, Z. Zhang, M. Lustig , "Reverse perfusion imaging of the cerebral venous system with displacement spectrum imaging (DiSpect)". *International Society of Magnetic Resonance in Medicine* 30^{th} *Annual Meeting*, 2022. **(was selected as the best trainee abstract by the ISMRM Perfusion Study Group and received Summa Cum Laude award)**

A. De Goyeneche, S. Ramachandran, K. Wang, **E. Karasan**, S. Yu, M. Lustig, "ResoNet: Physics informed deep learning based off-resonance correction trained on synthetic data". *International Society of Magnetic Resonance in Medicine* 30^{th} *Annual Meeting*, 2022.

E. Karasan, A. Hammerschmidt, V. Taracila, F. Robb, M. Lustig , "Advances in caterpillar traps: a highly flexible, distributed system of toroid cable traps". *International Society of Magnetic Resonance in Medicine* 29^{th} *Annual Meeting*, 2021.

E. Karasan, Z. Zhang, M. Lustig , "Retrospective vessel selective perfusion imaging with displacement spectrum imaging (DiSpect) at multiple mixing times". *International Society of Magnetic Resonance in Medicine* 28^{th} *Annual Meeting*, 2020. **(Received Magna Cum Laude award)**

E. Karasan, V. Taracila, F. Robb, M. Lustig , "The very RF hungry caterpillar trap (highly flexible, distributed system of toroid cable traps)". *International Society of Magnetic Resonance in Medicine* 28^{th} *Annual Meeting*, 2020.

K.Wang, M. Doneva, T. Amthor, V.C. Keil, **E. Karasan**, F. Tan, J.I. Tamir, S.X. Yu, M. Lustig , "High fidelity direct-contrast synthesis from magnetic resonance fingerprinting in diagnostic imaging". *International Society of Magnetic Resonance in Medicine* 28^{th} *Annual Meeting*, 2020.

Z. Zhang, **E. Karasan**, K. Gopalan, C. Liu, M. Lustig , "DiSpect: Displacement spectrum imaging of flow, diffusion and tissue perfusion using spin-labeling and stimulated echoes". *International Society of Magnetic Resonance in Medicine* 27^{th} *Annual Meeting*, 2019.

E. Karasan, A. Abid, R. J. Mieloszyk, B. S. Krauss, T. Heldt and G. C. Verghese , "An enhanced mechanistic model for capnography, with application to CHF-COPD discrimination". *2018 IEEE* 40^{th} *International Engineering in Medicine and Biology Conference*, 2018.

H.N. Schwerdt, M.Kim, **E. Karasan**, S. Amemori, D. Homma, H. Shimazu, T. Yoshida, R. Langer, A. M. Graybiel and M. J. Cima, "Subcellular electrode arrays for multisite recording of dopamine in vivo". *2017 IEEE* 30^{th} *International Conference on Micro Electro Mechanical Systems (MEMS)*, 2017.

Fellowships and Awards

2025 **International Society of Magnetic Resonance in Medicine (ISMRM) Imaging Neurofluids Study Group Trainee Abstract Second Place Award**
Abstract titled "Assessing slow cerebrospinal fluid flow dynamics with displacement encoded MRI." received second place award from the ISMRM Imaging Neurofluids Study Group.

2024 **Rising Stars in EECS Awardee**
Selected participant in the 2024 Rising Stars in EECS workshop.

2022 **International Society of Magnetic Resonance in Medicine (ISMRM) Perfusion Study Group Trainee Abstract First Place Award**
Abstract titled "Reverse Perfusion Imaging of the Cerebral Venous System with Displacement Spectrum Imaging (DiSpect)" was selected by the ISMRM Perfusion Study Group as the best trainee abstract.

2018-2020 **Berkeley Fellowship**
Two year fellowship awarded to outstanding applicants to doctoral programs in all fields.

2018 **AMITA 2018 Senior Academic Award**
Presented to an outstanding senior woman who has demonstrated the highest level of academic excellence through her coursework and related professional activities at MIT.

2018 **Robert M. Fano UROP Award**
Presented in recognition of my outstanding undergraduate research project titled "An Enhanced Mechanistic Model for Capnography, with Application to CHF-COPD Discrimination."

Skills

Software: Python, R, SQL, HFSS, Autodesk Fusion 360, Verilog, LabVIEW, Javascript, HTML/CSS, MATLAB, LaTeX, Perl

Hardware: Vector Network Analyzer, 3D printer, Oscilloscope