

# Batu Ozturkler

650-680-6618 | [ozt@stanford.edu](mailto:ozt@stanford.edu) | <http://stanford.edu/~ozt/>

## EDUCATION

### Stanford University

Sep 2019 – present

*Ph.D. student in Electrical Engineering; GPA: 3.99/4.00*

*Stanford, CA*

- Advisor: Prof. John Pauly and Prof. Mert Pilanci
- Focus Areas: Deep Learning, Optimization, Inverse Problems, Medical/Computational Imaging
- Expected Graduation Date: 12/2023

### Middle East Technical University (METU)

Aug 2015 – June 2019

*Bachelor of Science in Electrical Engineering; GPA: 3.96/4.00*

*Ankara, Turkey*

Rank: **3/413**

## EXPERIENCE

### Research Assistant

Sep 2019 – Present

*Magnetic Resonance Systems Research Laboratory at Stanford University (MRSRL)*

*Stanford, CA*

- Developed memory-efficient learning techniques for high-dimensional compressed-sensing MRI reconstruction with unrolled neural networks
- Worked on equivalent convex formulations to non-convex neural networks to enable robustness, interpretability, and convergence guarantees
- Developed a semi-supervised physics-driven augmentation framework for MRI reconstruction that improves robustness to signal-to-noise ratio change and motion corruption during acquisition

### Undergraduate Researcher

June 2017 – Sep. 2019

*Imaging and Computational Neuroscience Laboratory (ICON Lab) at Bilkent University*

*Ankara, Turkey*

- Worked on active learning using Determinantal Point Processes for improved image reconstruction and synthesis in multi-contrast MRI with conditional GANs
- Evaluated task-related activations in fMRI, dynamic causal modelling to assess connectivity between different brain regions
- Integrated motion-correction to a compressed sensing reconstruction method across coils and acquisitions and to simultaneous-multi-slice (SMS) acquisition for bSSFP imaging under the supervision of Prof. Tolga Cukur

### Undergraduate Researcher

March 2018 – June 2019

*STAR Research Program, Middle East Technical University*

*Ankara, Turkey*

- Worked on deep-learning based high-quality microwave imaging under the supervision of Prof. Figen Oktem

### Research Intern

July 2018 – August 2018

*Computer Vision Laboratory at ETH Zurich*

*Zurich, Switzerland*

- Compared beamforming and displacement tracking methods for imaging speed-of-sound with pulse-echo ultrasound under the supervision of Prof. Orcun Goksel
- Gave a poster presentation on this work at Amgen Scholars European Symposium, at Cambridge University, UK

### Summer Intern

June 2016 – July 2016

*Meteksan Defence*

*Ankara, Turkey*

- Underwater Acoustic Systems, development of platform sonar systems

### Summer Intern

July 2017 – August 2017

*Desistek Robotik Ltd. Şti*

*Ankara, Turkey*

- Robotics, electronic speed control of motors

## JOURNAL PUBLICATIONS

1. Tokgoz, S., Aydogdu, D., Ilhan, B., Sahin, Y., Bariseri, N., **Ozturkler, B.M.** and Çukur, T, 2020. Musical mirror-symmetrical movement tasks: comparison of rhythm versus melody-playing. *NeuroReport*, 31(7), pp.523-529.
2. Desai, A. D.\*, **Ozturkler, B. M.\***, Sandino, C. M., Vasanawala, S., Hargreaves, B. A., Re, C. M., Pauly, J.M and Chaudhari, A. S. (\* equal contribution) Noise2Recon: A Semi-Supervised Framework for Joint MRI Reconstruction and Denoising, preprint, *IEEE Transactions on Medical Imaging* (in submission) [Online] Available: <https://arxiv.org/abs/2110.00075>, 2021

## CONFERENCE PUBLICATIONS AND WORKSHOP PROCEEDINGS

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1. Sahiner, A., Ergen, T., **Ozturkler, B.M.**, Pauly, J., Mardani, M. and Pilanci, M. Unraveling Attention via Convex Duality: Analysis and Interpretations of Vision Transformers (in submission, under double-blind review)
2. Yurt, M.\*, **Ozturkler, B.M.\***, Yesiloglu, R., Pauly, J.M., Setsompop, K., Chaudhari, A.S. Conditional Diffusion Models for Inverse MR Image Recovery, ISBI 2022 (1-page abstract) (\* equal contribution)
3. **Ozturkler, B.M.**, Sahiner, A., Ergen, T., Desai, A.D., Sandino, C. M., Vasanaawala, S., Pauly, J., Mardani, M., Pilanci, M. Parallel Greedy Learning for Accelerating Cardiac Cine MRI, ISMRM 2022 (in submission)
4. Oscanoa, J. A., **Ozturkler, B.M.**, Iyer, S.S., Li, Z., Pilanci, M., Ennis, D.B., Vasanaawala, S. Coil-sketched unrolled networks for computationally-efficient deep MRI reconstruction, ISMRM 2022 (in submission)
5. Beg, H.\*, Gunel, B.\*, **Ozturkler, B.M.\***, Sandino, C. M., Pauly, J.M, Vasanaawala, S.,Chaudhari, A.S.,Desai, A.D. (\* equal contribution) Motion2Recon: A Motion-Robust Semi-Supervised Framework for MR Reconstruction, ISMRM 2022 (in submission)
6. Desai, A.D.\*, Gunel, B.\*, **Ozturkler, B.M.**, Beg, H., Vasanaawala, S., Hargreaves, B.A., Ré, C., Pauly, J.M. and Chaudhari, A.S. (\* equal contribution) VORTEX: Physics-Driven Data Augmentations for Consistency Training for Robust Accelerated MRI Reconstruction. preprint, MIDL 2022 (in submission). [Online] Available: <https://arxiv.org/abs/2111.02549>, 2021
7. **Ozturkler, B.M.**, Sahiner, A., Ergen, T., Desai, A.D., Pauly, J.M., Vasanaawala, S., Mardani, M. and Pilanci, M. Greedy Learning for Large-Scale Neural MRI Reconstruction. NeurIPS 2021 Workshop on Deep Learning and Inverse Problems, **oral presentation**. Available: <https://openreview.net/forum?id=tKeEIFvmENy>
8. Sahiner, A.\*, Ergen, T.\*, **Ozturkler, B.M.**, Bartan, B., Pauly, J., Mardani, M. and Pilanci, M. (\* equal contribution) Hidden Convexity of Wasserstein GANs: Interpretable Generative Models with Closed-Form Solutions. ICLR 2022 (accepted). Available: <https://arxiv.org/abs/2107.05680>
9. Ergen, T.\*, Sahiner, A.\*, **Ozturkler, B. M.**, Pauly, J. , Mardani, M.,Pilanci, M. (\* equal contribution), Demystifying Batch Normalization in ReLU Networks: Equivalent Convex Optimization Models and Implicit Regularization, ICLR 2022 (accepted). Available: <https://arxiv.org/abs/2103.01499>
10. **Ozturkler, B. M.**, Sahiner, A., Pilanci, M., Vasanaawala, S., Pauly, J., Mardani, M. Scalable and Interpretable Neural MRI Reconstruction via Layer-Wise Training, ISMRM 2021
11. Desai, A.\*, **Ozturkler, B. M.\***, Sandino, C. S., Hargreaves, B., Pauly, J.\*, Chaudhari, A.\* (\* equal contribution), Noise2Recon: A Semi-Supervised Framework for Joint MRI Reconstruction and Denoising using Limited Data ISMRM 2021. **Magna Cum Laude (Awarded to top 15% of all works)**
12. Sahiner, A., Mardani, M., **Ozturkler, B. M.**, Pilanci, M., Pauly, J. Convex Regularization Behind Neural Reconstruction, ICLR 2021. Available: <https://arxiv.org/abs/2012.05169>
13. Rau, R., Ozkan, E., **Ozturkler, B. M.**, Gastli, L., Goksel, O., Displacement Estimation Methods for Speed-of-Sound Imaging in Pulse-Echo, 2020 IEEE International Ultrasonics Symposium (IUS), Las Vegas, NV, USA, 2020, pp. 1-4, doi: 10.1109/IUS46767.2020.9251781.

## TECHNICAL SKILLS

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**Languages:** Python, MATLAB, R, C/C++

**Deep Learning Libraries:** PyTorch, TensorFlow, Jax

**Other:** Git, L<sup>A</sup>T<sub>E</sub>X, Docker, Google Cloud Platform, Microsoft Azure, Statistical Parametric Mapping (SPM), LABVIEW, Field-II, Key Creator, Lt Spice, Agilent Vee, Quartus 2, Verilog

## AWARDS AND HONOURS

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- National Science Foundation, Graduate Research Fellowship (2021): Three years of financial support and a cost of education allowance to the institution.
- Stanford University Electrical Engineering Departmental Fellowship (2019-2020): Full tuition waiver & stipend during the first year of the Ph.D. program.
- Three times a winner of the Bulent Kerim Altay Prize-METU: Awarded to students with a GPA of 4.00/4.00 per semester

- Awarded the AdimODTU undergraduate research project financial support for our work on deep-learning based high-quality microwave imaging
- Admitted to Amgen Scholars European Program 2018: Full financial support for research internships at ETH Zurich
- Ranked 3rd in the Hult Prize METU 2017 competition
- Ranked 197<sup>th</sup> nationally in the University Entrance Examination in Turkey among 2 million participants

## PROFESSIONAL ACTIVITIES

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- Reviewer:
  - IEEE Transactions on Medical Imaging
- Talks:
  - Greedy Learning for Large-Scale Neural MRI Reconstruction, NeurIPS 2021 Workshop on Deep Learning and Inverse Problems

## OTHER INTERESTS

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- Published a news feature on COVID-19 testing in SIAM News:  
Donoho, D., Lotfi, M., **Ozturkler, B. M.**, “The Mathematics of Mass Testing for COVID-19”, SIAM News, July/August 2020. <https://sinews.siam.org/Details-Page/the-mathematics-of-mass-testing-for-covid-19>