TOYGAN KILIC

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Skills

Programming	Python, MATLAB, C++, VHDL
ML Related	PyTorch, OpenCV, MLflow, Pandas
Research Interests	Machine/Deep learning, MRI reconstruction, Radar Systems, HDR/camera imaging
Systems	Linux/Unix, Git/GitHub, VS Code
Tools	MRI sequence programming (Siemens IDEA)

Education

2021 – 2026 **Ph.D.** in Electrical & Computer Engineering **University of Minnesota** (GPA: 4.00/4.00)
Thesis: *Deep Learning Methods for Ultra High Field MRI*
Advisor: Prof. Mehmet Akçakaya

2016 – 2019 **M.S.** in Electrical & Electronics Engineering **Bilkent University** (GPA: 3.45/4.00)
Thesis: *Rapid Multi-Contrast MRI and Time-of-Flight Angiography*
Primary Advisor: Assoc. Prof. Emine Ülkü Sarıtaş
Secondary Advisor: Prof. Tolga Çukur

2011 – 2016 **B.S.** in Electrical & Electronics Engineering **Bilkent University** (GPA: 3.41/4.00)

Work Experience

Research Assistant, UMN (Minnesota, USA) Aug 2021 – January 2026
- Developed deep learning methods for B_1^+ inhomogeneity correction at 7T in pTx, in collaboration with Siemens.
- Advanced diffusion-weighted MRI reconstruction using deep learning with physics-driven priors and score-based denoising.
- Implemented optimization algorithms for parallel transmit (pTx) pulse design and reconstruction methods.
- Published 1 journal article and 8 conference papers on MRI reconstruction and pTx methods.

Digital Design Engineer, ASELSAN (Ankara, Turkey) Nov 2020 – Jul 2021
- Implemented and optimized radar algorithms on FPGA to enhance system performance.
- Integrated external components; implemented UART and I^2C interfaces for FPGA systems.

Radar System Design Engineer, ASELSAN (Ankara, Turkey) May 2019 – Nov 2020
- Developed 3D radar imaging algorithms for high-resolution spatial mapping.
- Designed target detection and classification algorithms
- Performed link-budget and system performance analyses
- Defined system requirements and specifications for radar platforms.

R&D Engineer, ORTANA (Ankara, Turkey) Aug 2018 – May 2019
- Implemented HDR imaging algorithms and end-to-end camera processing pipelines in C++/MATLAB.
- Built a camera image quality test lab and evaluated performance with Imatest
- Built a camera test laboratory

Research Assistant, Bilkent University (Ankara, Turkey) Jan 2016 – Feb 2019
- Designed multi-contrast MRI reconstruction methods for parallel imaging
- Programmed pulse sequences on Siemens IDEA for compressed sensing
- Collaborated with radiologists on TOF angiography, improving vessel visualization
- Conducted extensive *in vivo* experiments.

Undergraduate Research Assistant, Bilkent University (Ankara, Turkey) Jan. 2013 – Jan. 2015
- Examined EEG data with Fieldtrip Toolbox (Supervisor: Asst. Prof. Hulusi Kafalıgönül).
- Simulated E-Class Power Amplifier (Supervisor: Prof. Ergin Atalar).

Internships

Embedded Software Engineer (Intern), Greinon Engineering AB (Lund, Sweden) Jan 2015 – Feb 2015

– Implemented communication between IoT devices using the CC3200 LaunchPad.

Digital Design Engineer (Intern), ASELSAN (Ankara, Turkey) Jun 2013 – Sep 2013

– Implemented the Hadamard Transform using DSP Builder (Simulink) for VHDL generation.

Summer Intern, National Magnetic Resonance Research Center (Ankara, Turkey) Jun 2013 – Sep 2013

– Analyzed LFP brain signals using Hilbert and Wavelet transform techniques.

Academic Honors and Awards

- ECE Department Fellowship, **University of Minnesota** 2021–2022
- Best Student Paper Award, IEEE EMBS Turkey, *29th IEEE SIU* May 2018
- Dean's Honor List (7 semesters) 2011–2015
- Tuition Waiver 2013–2015

Teaching Experiences

Graduate Teaching Assistant, Bilkent University (Ankara, Turkey)

– EEE 574 - Foundations of Magnetic Resonance Imaging: Grader Jan. 2018 – Jun. 2018

– GE 402 - Innovative Design and Entrepreneurship II: Grader and Lab Assistant Jan. 2018 – Jun. 2018

– EEE 530 - Digital Communications Theory: Grader Oct. 2017 – Jan. 2018

– EEE 212 - Microprocessors: Lab Assistant Jan. 2016 – Jun. 2017

– EEE 211 - Analog Electronics: Lab Assistant Oct. 2016 – Jan. 2017

Undergraduate Teaching Assistant, Bilkent University (Ankara, Turkey)

– CS 113 - Introduction to Computing (MATLAB): Lab Assistant Jun. 2015 – Aug. 2015, Oct. 2015 – Jan. 2016

– PHYS 102 - General Physics II: Grader Jun. 2014 – Sept. 2014

Relevant Coursework

- EE 5561 – Image Processing and Applications: From Linear Filters to Artificial Intelligence
- CSCI 5521 – Machine Learning Fundamentals
- EE 5239 – Introduction to Nonlinear Optimization

Publications

Journal Articles

[1] **Kilic, T**, P Liebig, OB Demirel, J Herrler, A Nagel, K Ugurbil, and M Akcakaya. "Unsupervised Deep Learning with Convolutional Neural Networks for Static Parallel Transmit Design: A Retrospective Study". In: *Magn. Reson. Med.* (2024). Online ahead of print. DOI: 10.1002/mrm.30014.

[2] E Kopanoglu, A Gungor, **Kilic, T**, EU Saritas, KK Oguz, T Cukur, and HE Guven. "Simultaneous use of Individual and Joint Regularization Terms in Compressive Sensing: Joint Reconstruction of Multi-Channel Multi-Contrast MRI Acquisitions". In: *NMR Biomed.* (2021). DOI: 10.1002/nbm.4247.

[3] OB Demirel, **Kilic, T**, T Cukur, and EU Saritas. "Anatomical Measurements Correlate with Individual Magnetostimulation Thresholds for kHz-range Homogeneous Magnetic Fields". In: *Med. Phys.* 47 (2020), pp. 1836–1844. DOI: 10.1002/mp.14032.

[4] LK Senel, **Kilic, T**, A Gungor, E Kopanoglu, HE Guven, EU Saritas, A Koc, and T Cukur. "Statistically Segregated k-Space Sampling for Accelerating Multiple-Acquisition MRI". In: *IEEE Trans. Med. Imag.* 38.7 (2019), pp. 1701–1714. DOI: 10.1109/TMI.2019.2892378.

Conference Proceedings

[1] M. Saberi, **Kilic, T**, and M. Akcakaya. "UMPIRE-Net: Unrolled Magnitude-Phase Regularization Network for MRI Reconstruction". In: *Proceedings of the 34th Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM)*. Cape Town, South Africa, May 2026.

[2] J. Yun, **Kilic, T**, J. Herrler, P. Liebig, K. Ugurbil, and M. Akcakaya. "Hard-Constrained Parallel Transmit Design with Unrolled Homeomorphic Projection". In: *Proceedings of the 34th Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM)*. Cape Town, South Africa, May 2026.

[3] J. Yun, **Kilic, T**, J. Herrler, P. Liebig, K. Ugurbil, and M. Akcakaya. "Strict Quadratically-Constrained Parallel Transmit Design with Unrolled Homeomorphic Projection". In: *Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI)*. London, UK, Apr. 2026.

[4] **Kilic, T**, YU Alcalar, S Moeller, and M Akcakaya. "Phase-Adaptive Averaging and Score-Based Denoising for Inverse Problems in Diffusion Imaging". In: *Proc. Asilomar Conf. Signals, Systems, and Computers*. Pacific Grove, CA, 2025.

[5] **Kilic, T**, J Herrler, P Liebig, OB Demirel, A Nagel, K Ugurbil, and M Akcakaya. "Towards Fast Hard-Constrained Parallel Transmit Design in Ultrahigh Field MRI With Physics-Driven Neural Networks". In: *Proc. IEEE Int. Symp. Biomed. Imaging (ISBI)*. 2024.

[6] **Kilic, T**, J Herrler, P Liebig, OB Demirel, A Nagel, K Ugurbil, and M Akcakaya. "Towards Physics-Driven Neural-Network pTx Design with Hard Constraints". In: *Proc. 32nd Annual Meeting ISMRM*. Singapore, 2024.

[7] OB Demirel, C Zhang, B Yaman, **Kilic, T**, S Moeller, C Shenoy, S Weingärtner, T Leiner, and M Akçakaya. "Database-Free ZS-Deep Learning Reconstruction for Highly-Accelerated Free-Breathing Perfusion CMR". In: *Proc. 31st Annual Meeting ISMRM*. Toronto, Canada, 2023, p. 0388.

[8] **Kilic, T**, P Liebig, OB Demirel, J Herrler, A Nagel, K Ugurbil, and M Akçakaya. "Unsupervised Deep Learning for Fast Parallel Transmit Design". In: *ISMRM Workshop on Ultra-High Field MR*. 2022.

[9] OB Demirel, **Kilic, T**, T Cukur, and EU Saritas. "Simple Anatomical Measures Correlate with Individual PNS Thresholds for kHz-range Homogeneous Magnetic Fields". In: *Proc. 28th Annual Meeting ISMRM*. Virtual, 2020, p. 1127.

[10] E Kopanoglu, A Gungor, **Kilic, T**, EU Saritas, K Oguz, T Cukur, and HE Guven. "Multi-Channel Multi-Contrast Reconstructions via Simultaneous Use of Individual and Joint Regularization Terms". In: *Proc. 27th Annual Meeting ISMRM*. Montreal, Canada, 2019, p. 4748.

[11] **Kilic, T**, O Algin, T Cukur, and EU Saritas. "Joint Partial Fourier and Compressed Sensing Reconstruction for Accelerated Time-of-Flight MR Angiography". In: *Proc. 26th IEEE SIU*. Izmir, Turkey, 2018.

[12] E Kopanoglu, A Gungor, **Kilic, T**, EU Saritas, T Cukur, and HE Guven. "Compressive Sensing Reconstruction for Multi-Contrast Data with Unequal Acceleration Rates". In: *Proc. 26th Annual Meeting ISMRM*. Paris, France, 2018, p. 3534.

[13] **Kilic, T**, E Ilicak, T Cukur, and EU Saritas. "Improved SPIRiT Operator for Joint Reconstruction of Multiple T2-Weighted Images". In: *Proc. 25th Annual Meeting ISMRM*. Hawaii, USA, 2017, p. 5165.

[14] E Kopanoglu, A Gungor, **Kilic, T**, EU Saritas, T Cukur, and HE Guven. "Joint Reconstruction of Multi-Contrast Images Using Joint and Individual Regularization". In: *Proc. 25th Annual Meeting ISMRM*. Hawaii, USA, 2017, p. 3875.