

# Mahmut Yurt

Department of Electrical and Electronics  
Engineering at Bilkent University  
Imaging and Computational Neuroscience Lab  
at National Magnetic Resonance Research Center

Ankara, Turkey  
☎ +90 534 683 96 18  
✉ mahmut@ee.bilkent.edu.tr  
📱 mahmutyurt.netlify.app

## Research Interest

- Medical Imaging
- Computer Vision
- Magnetic Resonance Imaging
- Deep Learning

## Education

- Jul 2019 **M.Sc.**, *Bilkent University*, Ankara/Turkey, *Department of Electrical and Electronics Engineering*.  
present Advisor: Prof. Tolga Çukur  
CGPA: 4.00/4.00  
Thesis: Supervised and Semi-Supervised Deep Generative Models for Robust Multi-Contrast MRI Synthesis and Reconstruction
- Sep 2014 **B.Sc.**, *Bilkent University*, Ankara/Turkey, *Department of Electrical and Electronics Engineering*.  
Jun 2019 CGPA: 3.88/4.00

## Honors and Awards

- 2019–present Bilkent University Graduate Study Comprehensive Scholarship: full tuition waiver and stipend during the M. Sc. program
- 2019–present Scientific and Technological Research Council of Turkey: monthly stipend during the M. Sc. program
- 2019 Ranked 22nd among 300,000 participants in Turkish Academic Personnel and Postgraduate Education Entrance Exam (ALES)
- 2019 Research excellence award in Graduation Awards at Bilkent University
- 2014–2019 Bilkent University Comprehensive Scholarship: full tuition waiver and stipend during the B. Sc. program
- 2014–2019 Turkish Prime Ministry: monthly stipend during the B. Sc. program, awarded to only 100 students in Turkey
- 2018 Best research paper award in Bilkent University Research Graduate Conference
- 2014 Ranked 27th among 2,000,000 participants in Turkish National University Entrance exam (LYS)

## Publications

### Articles

- [5] **M. Yurt**, S. U. H. Dar, A. Erdem, E. Erdem, K. K. Oğuz, and T. Çukur, “mustGAN: Multi-stream generative adversarial networks for MR image synthesis,” *Medical Image Analysis, under second round revision*, 2020. [Online]. Available: <https://arxiv.org/abs/1909.11504>.
- [4] S. U. H. Dar, **M. Yurt**, M. Shahdloo, M. E. Ildız, B. Tınaz, and T. Çukur, “Prior-guided image reconstruction for accelerated multi-contrast MRI via generative adversarial networks,” *IEEE Journal of Selected Topics in Signal Processing*, vol. 14, no. 6, pp. 1072–1087, 2020. [Online]. Available: <https://ieeexplore.ieee.org/document/9115255>.
- [3] S. U. Dar, **M. Yurt**, L. Karacan, A. Erdem, E. Erdem, and T. Çukur, “Image synthesis in

multi-contrast MRI with conditional generative adversarial networks,” *IEEE Transactions on Medical Imaging*, vol. 38, no. 10, pp. 2375–2388, 2019. [Online]. Available: <https://ieeexplore.ieee.org/document/8653423>.

### Work in Progress

- [2] **M. Yurt**, B. Tınaz, M. Özbey, S. U. H. Dar, and T. Çukur, “Semi-supervised learning of multi-contrast MRI synthesis without fully-sampled ground truth data,” 2020.
- [1] **M. Yurt**, M. Özbey, S. U. H. Dar, B. Tınaz, and T. Çukur, “Progressively volumetrized deep generative models for data-efficient contextual learning of MR image recovery,” 2020.

### Peer-Reviewed Conference Proceedings

- [10] **M. Yurt**, B. Tınaz, M. Özbey, S. U. H. Dar, and T. Çukur, “Semi-supervised learning of multi-contrast MRI synthesis without fully-sampled ground truth data,” in *Medical Imaging Meets NeurIPS (submitted, under evaluation)*, 2020.
- [9] **M. Yurt** and T. Çukur, “Multi-image super resolution in multi-contrast MRI,” in *IEEE 28th Signal Processing and Applications (SIU)*, Gaziantep, Oct. 2020.
- [8] **M. Yurt**, S. U. H. Dar, A. Erdem, E. Erkut, and T. Çukur, “A multi-stream GAN approach for multi-contrast MRI synthesis,” in *28th annual meeting of International Society for Magnetic Resonance Imaging (ISMRM)*, Paris, Aug. 2020.
- [7] S. U. H. Dar, **M. Yurt**, M. Özbey, and T. Çukur, “Hybrid deep neural network architectures for multi-coil MR image reconstruction,” in *28th annual meeting of International Society for Magnetic Resonance Imaging (ISMRM)*, Paris, Aug. 2020.
- [6] **M. Yurt**, S. U. H. Dar, A. Erdem, E. Erdem, and T. Çukur, “Adaptive fusion via dual-branch GAN for multi-contrast MRI synthesis,” in *IEEE 17th International Symposium on Biomedical Imaging (ISBI)*, Iowa City, Apr. 2020.
- [5] M. Ozbey, **M. Yurt**, S. U. H. Dar, and T. Çukur, “Three-dimensional MR image synthesis with progressive generative adversarial networks,” in *IEEE 17th International Symposium on Biomedical Imaging (ISBI)*, Iowa City, Apr. 2020.
- [4] S. U. H. Dar, **M. Yurt**, M. Özbey, and T. Çukur, “Hybrid deep neural networks for parallel mr image reconstruction,” in *IEEE 17th International Symposium on Biomedical Imaging (ISBI)*, Iowa City, Apr. 2020.
- [3] S. U. H. Dar, **M. Yurt**, L. Karacan, A. Erdem, E. Erdem, and T. Çukur, “Journal paper: Image synthesis in multi-contrast MRI with conditional generative adversarial networks,” in *IEEE 17th International Symposium on Biomedical Imaging (ISBI)*, Iowa City, Apr. 2020.
- [2] S. U. H. Dar, **M. Yurt**, M. Shahdloo, M. E. Ildız, and T. Çukur, “Joint recovery of variably accelerated multi-contrast mri acquisitions via generative adversarial networks,” in *27th annual meeting of International Society for Magnetic Resonance Imaging (ISMRM)*, Montreal, May 2019.

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## Academic Experience

### Graduate Researcher, ICON Lab/UMRAM, Bilkent University

- 2020–present **Deep generative models for data-efficient learning of MR image recovery.**  
We develop a novel deep generative model for data-efficient contextual learning of volumetric MR image recovery by performing a series of cross-sectional tasks defined across individual rectilinear orientations. (*Yurt et. al., to be submitted to Nature Machine Intelligence*)
- 2020–present **Semi-supervised learning of MR image synthesis without fully-sampled training ground truths.**  
We propose a novel semi-supervised MRI synthesis model that enables recovery of fully-sampled images of a target contrast without requiring fully-sampled ground truths in the training set. (*Yurt et. al., to be submitted to IEEE Transactions on Medical Imaging*)

2019–present **Multi-stream generative adversarial networks for multi-contrast MRI synthesis.**  
 We develop a novel multi-stream generative adversarial network (mustGAN) architecture for multi-contrast MRI synthesis that complementarily fuses information across multiple one-to-one streams and a single many-to-one stream. (*Yurt et. al., under second-round review in Medical Image Analysis*)

2019–present **Prior-guided image reconstruction for accelerated multi-contrast MRI via generative adversarial networks.**  
 We performed synergistic reconstruction-synthesis of multi-contrast MRI by complementarily exploiting high-frequency, low-frequency, and perceptual priors available within lightly- and heavily-undersampled images of distinct contrasts. (*Dar et al, IEEE JSTSP, 2020*)

Undergraduate Researcher, ICON Lab/UMRAM, Bilkent University

2017–2019 **Multi-contrast MRI synthesis with conditional generative adversarial networks.**  
 We develop conditional generative adversarial network models for MRI synthesis by using cycle-consistency for unpaired training data and pixel-wise consistency for paired training data. (*Dar et. al., IEEE TMI, 2019*)

Teaching Assistant

2019–present **Electrical and Electronics Engineering at Bilkent University.**

- Neural Networks
- Signals and Systems
- Industrial Design Project I
- Industrial Design Project II

## Programming Skills

Programming Languages	Python (professional), Matlab (professional), Java (intermediate), VHDL (professional), Verilog (intermediate), C++ (intermediate), Android (often used)
Frameworks	PyTorch (professional), TensorFlow (professional), NumPy (professional), Matplotlib (professional), OpenCV (intermediate), Git (intermediate)
Software Tools	L <sup>A</sup> T <sub>E</sub> X (professional), Inkscape (professional), Illustrator (professional), Photoshop (intermediate), Spyder (professional), LTSpice (frequently used), FSL (frequently used), AWR (intermediate), DICOM (intermediate)