Moo Shahdloo

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Academic Experience

2020–present	**Postdoctoral Researcher**, *FMRIB Centre/University of Oxford*.
2014–2020	**Graduate Researcher**, *ICON Lab/Bilkent University*.
	Contributing to various research projects, with focus on attentional modulations of the cortical representation of audio-visual natural stimuli, and developing reconstruction techniques for accelerated MRI.
2014–2020	**Teaching Assistant**, *Bilkent University*.

- Statistical Learning
- Biomedical Signals and Instrumentation
- Microcontrollers
- Computational Neuroscience
- Neural Networks
- Electromagnetics

Education

Jan 2017 Feb 2020	**Ph.D.**, *Bilkent University*, Ankara/Turkey, *Electrical and Electronics Engineering Department*. Electrical and Electronics Engineering Advisor: Tolga Çukur Dissertation title: *Optimization and Machine-Learning in MRI: Applications in Rapid MR Image Reconstruction and Encoding Models of Cortical Representations*
Sep 2014 Dec 2016	**M.Sc.**, *Bilkent University*, Ankara/Turkey, *Electrical and Electronics Engineering Department*. Electrical and Electronics Engineering Advisor: Tolga Çukur
Sep 2007 Jun 2011	**B.Sc.**, *Amirkabir University of Technology*, Tehran/Iran, *Electrical Engineering Department*. Electrical Engineering/Control Engineering Advisor: Behzad Samadi

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Research Experience

Postdoctoral Researcher, FMRIB Centre, University of Oxford

2020–present	**Motion-correction for awake non-human primate fMRI**.
	Functional imaging of awake non-human primates is challenging not only due to their smaller brain size, but also due to excessive local field fluctuations due to animals' motion. Using a novel pulse sequence, efficient reconstruction techniques, and a custom-made multi-channel coil we aim to perform accelerated functional scans of awake monkeys.

Graduate Researcher, ICON Lab/UMRAM, Bilkent University

2018–present	**Hierarchy of the auditory representation revealed by deep models**.
	Using a natural story listening experimental paradigm, we use computational models based on deep neural networks to study the effect of context integration on the representation of natural stories across the cortex. We are further interested in studying the attentional modulations of this property across cortex. *(Manuscript in preparation)*
2018–present	**The interaction of action-based attention and semantic representation**.
	We use voxelwise models to estimate the contribution of a multitude of action categories in natural movies to BOLD responses across cortex. We then study the attentional modulation of the semantic representation under different attention tasks. *(Manuscript in preparation)*

2018–2019 **Joint reconstruction of heavily undersampled acquisitions using generative adversarial networks**.
Using conditional generative adversarial networks, we performed synergistic reconstruction-synthesis of multi-contrast MRI. This method preserves high-frequency details of the target contrast by relying on the shared high-frequency information available from the source contrast, and prevents feature leakage or loss by relying on the undersampled acquisitions of the target contrast. *(Dar et al, ArXiv, 2017 & IEEE JSTSP, 2020)*

2016–2018 **Projection onto epigraph sets for rapid self-tuning CS-MRI**.
We proposed a self-tuning reconstruction framework for general single/multi channel and single/multi acquisition datasets, named PESCaT. PESCaT outperforms conventional auto-tuning reconstruction methods while benefiting from 10x less computational burden. *(Shahdloo et al, IEEE TMI, 2019)*

2016–2017 **Trade off between fat-suppression and partial-voluming in bSSFP acquisitions**.
Fat-suppression in bSSFP can be achieved using weighted average of in-phase and out-of-phase acquisitions raised to a negative power. We studied the effects of the power parameter on the trade off between fat-suppression and partial voluming artifacts under various experimental setups. We devised optimal parameter values meeting the fat-suppression and partial voluming requirements. *(Manuscript in preparation)*

2014–2016 **Biased-competition in semantic representation during divided attention**.
We studied the degree to which the biased-competition (BC) hypothesis can account for semantic modulation during divided attention. We showed that the representations across the cortex follow the BC predictions. Furthermore, intrinsic selectivity of cortical areas biases the competition in category selective areas of the ventral temporal cortex. *(Shahdloo et al, NeuroImage, 2019)*

Experience in Industry

Jan 2014-Sep 2014 **Hardware developer**, *Farineh Fanavar*, Tehran, Iran.
Implemented industrial communication protocols on low-level embedded hardware environments (C, C++) to be used in distributed control systems.

2013-2014 **Senior software developer**, *K.A.G.*, Tehran, Iran.
Implemented industrial communication protocols (C, C#) to be used in dispatching systems in oil and gas industry.

2011-2013 **RnD Engineer**, *Kerman Tablo*, Tehran, Iran.
Implemented process controllers (C, Assembly) to be used in Iran South Pars refinery plant. Made improvements on different IO modules by redesigning and enhancing low-level hardware and software modules. Wrote Linux kernel driver modules for various home-built devices.

Publications

Articles

[4] S. U. H. Dar, M. Yurt, **M. Shahdloo**, E. Ildiz, B. Tinaz, and T. Çukur, "Prior-Guided Image Reconstruction for Accelerated Multi-Contrast MRI via Generative Adversarial Networks *(in press)*," *IEEE Journal of Selected Topics on Signal Processing*, May 2020. DOI: 10.1109/JSTSP.2020.3001737.

[3] **M. Shahdloo**, E. Çelik, and T. Çukur, "Biased competition in semantic representation during natural visual search," *NeuroImage*, vol. 216, no. 1, p. 116 383, Aug. 2020. DOI: 10.1016/j.neuroimage.2019.116383.

[2] **M. Shahdloo**, E. Ilicak, M. Tofighi, E. U. Saritas, A. E. Cetin, and T. Çukur, "Projection onto Epigraph Sets for Rapid Self-Tuning Compressed Sensing MRI," *IEEE Transactions on Medical Imaging*, vol. 38, no. 7, pp. 1677–1689, Jul. 2019. DOI: 10.1109/TMI.2018.2885599.

[1] S. U. H. Dar, M. Yurt, **M. Shahdloo**, and T. Çukur, "Synergistic Reconstruction and Synthesis via Generative Adversarial Networks for Accelerated Multi-Contrast MRI," *arxiv*, 2018. eprint: 1805.10704v1.

Peer Reviewed Conference Publications

[7] S. U. H. Dar, M. Yurt, **M. Shahdloo**, and T. Çukur, "Joint recovery of variably accelerated multi-contrast mri acquisitions via generative adversarial networks," in *27th annual meeting of the International Society for MR in Medicine (ISMRM)*, Montreal, Jun. 2019, p. 0666.

[6] **M. Shahdloo**, M. Acar, and T. Çukur, "Attention during story listening modulates temporal receptive windows across human cortex," in *Conference for Cognitive Computational Neuroscience (CCN)*, Berlin, Sep. 2019, PS–1A.52.

[5] **M. Shahdloo** and T. Çukur, "Trade-off between fat-suppression and partial-voluming in weighted combination alternating repetition-time (ATR) balanced SSFP," in *36th annual meeting of the European Society for MRin Medicine and Biology (ESMRMB)*, Rotterdam, Oct. 2019, p. L06.09.

[4] **M. Shahdloo**, B. Ürgen, E. Çelik, and T. Çukur, "Attention to action categories shifts semantic tuning toward targets across the brain," in *25th annual meeting of the Organization for Human Brain Mapping (OHBM)*, Rome, Jun. 2019, T661.

[3] **M. Shahdloo**, E. Ilicak, M. Tofighi, E. U. Saritas, A. E. Cetin, and T. Çukur, "Rapid self-tuning compressed-sensing MRI using projection onto epigraph sets," in *26th annual meeting of the International Society for MR in Medicine (ISMRM)*, Paris, Jun. 2018, p. 0251.

[2] **M. Shahdloo** and T. Çukur, "Biased competition in semantic representations during category-based visual search," in *23rd annual meeting of the Organization for Human Brain Mapping (OHBM)*, Vancouver, Jun. 2017.

[1] **M. Shahdloo**, E. Ilicak, M. Tofighi, E. U. Saritas, A. E. Cetin, and T. Çukur, "Adaptive wavelet thresholding for profile-encoding reconstruction of balanced steady-state free precession acquisitions," in *34th annual meeting of the European Society for MRin Medicine and Biology (ESMRMB)*, Barcelona, Oct. 2017.

Programming Skills

Programming Languages	Python (professional), Matlab (professional), C (professional), C++ (professional), R (intermediate), C# (intermediate), Fortran (intermediate)
Tools	Tensorflow (professional), Keras (professional), PyTorch (intermediate), NiPype (frequently used), Git (frequently used), SVN (often used)

Honors and Awards

2014–2021	Full scholarship granted by Bilkent University for graduate studies
2012	Ranked 28th among 100k participants in Iranian national higher education examination
2006	Bronze medal in the Iranian National Physics Olympiad

Community Service

Ad-hoc reviewing	IEEE Transactions on Medical Imaging
	Frontiers in Neuroscience
	Conference on Cognitive Computational Neuroscience (CCN)

Scientific Organization Memberships

- International Society for MR in Medicine (ISMRM)
- European Society for MR in Medicine and Biology (ESMRMB)
- Organization for Human Brain Mapping (OHBM)

References

- Dr. Mark Chiew,
  FMRIB Centre, University of Oxford,
  mark.chiew@ndcn.ox.ac.uk

- Dr. Tolga Çukur,
  EEE Dept. and UMRAM, Bilkent University,
  cukur@ee.bilkent.edu.tr