Muhammad Usama Mirza

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Education

- **M.Sc. Electrical and Electronics Engineering**, Bilkent University, Ankara, Turkey 2021-Present
  CGPA: 3.77 / 4.00
  Courses:
  - Neural Networks
  - Machine Learning
  - Introduction to Computer Vision
  - Advanced Topics in Machine Learning and Signals and Systems

- **B.Sc. Electrical Engineering**, SEECS, NUST, Islamabad, Pakistan 2017-2021
  CGPA: 3.77 / 4.00
  Final Year Project: Crop Monitoring using Computer Vision and IoT
  Semester Projects:
  - Generating Synthetic Data for Deep Learning
  - Audio Classification using Machine Learning
  - Maze Solving Robot
  - Video Game using C++

Research Publications (Google Scholar)

Journal Publications

- **M. U. Mirza**, O. Dalmaz, H. A. Bedel, G. Elmas, Y. Korkmaz, A. Gungor, S. Dar & T. Çukur. (2023). Learning Fourier-Constrained Diffusion Bridges for MRI Reconstruction. arXiv preprint arXiv:2308.01096.

- O. Dalmaz, **M. U. Mirza**, G. Elmas, M. Özbey, S. Dar, E. Ceyani, K. K. Oguz, S. Avestimehr & T. Çukur, "One model to unite them all: Personalized federated learning of multi-contrast MRI synthesis," in Medical Image Analysis, Volume 94, p. 103121, 2024.

Conference Proceedings

- **M. U. Mirza**, O. Dalmaz, H. A. Bedel, G. Elmas, A. Gungor, T. Çukur, "MRI Reconstruction with Fourier-Constrained Diffusion Bridges" in NeurIPS Medical Imaging Meets, New Orleans, LA, USA, Dec. 2023.

- O. Dalmaz, B. Saglam, G. Elmas, **M. U. Mirza** and T. Çukur, "Denoising Diffusion Adversarial Models for Unconditional Medical Image Generation," in 31st Signal Processing and Communications Applications Conference (SIU), Istanbul, Turkiye, Jul. 2023.

- **M. U. Mirza** and T. Çukur, "Super-Resolution Diffusion Model for Accelerated MRI Reconstruction," in 31st Signal Processing and Communications Applications Conference (SIU), Istanbul, Turkiye, Jul. 2023.

- O. Dalmaz, **M. U. Mirza**, G. Elmas, M. Özbey, S. Dar, E. Ceyani, S. Avestimehr, and T. Çukur, "A Personalized Federated Learning Approach for Multi-Contrast MRI Translation," in 31st annual meeting of International Society for Magnetic Resonance Imaging (ISMRM), Toronto, Canada, June 2023.

- O. Dalmaz, **M. U. Mirza**, G. Elmas, M. Özbey, S. Dar, E. Ceyani, S. Avestimehr, and T. Çukur, "Personalized, Federated, And Unified MRI Contrast Synthesis," in IEEE 20th International Symposium on Biomedical Imaging (ISBI), Virtual Conference, Apr. 2023.

- O. Dalmaz, **M. U. Mirza**, G. Elmas, M. Özbey, S. Dar, E. Ceyani, S. Avestimehr, and T. Çukur, "pFLSynth: Personalized Federated Learning of Image Synthesis in Multi-Contrast MRI," in NeurIPS Medical Imaging Meets, Virtual Conference, Dec. 2022.
- O. Dalmaz, **M. U. Mirza**, G. Elmas, M. Özbey, S. Dar, and T. Çukur "A Specificity-Preserving Generative Model for Federated MRI Translation," in 3rd MICCAI Workshop on "Distributed, Collaborative and Federated Learning" (MICCAI-DeCaF), Virtual Conference, Sep. 2022.
- **M. U. Mirza**, O. Dalmaz, and T. Çukur, "Skip Connections for Medical Image Synthesis with Generative Adversarial Networks," IEEE 30th Signal Processing and Communications Applications Conference (SIU), Karabuk, Turkey, May, 2022

Academic Experience

- **Graduate Research Assistant**, National Magnetic Resonance Research Center, Ankara 2021-Present
  Worked on developing novel techniques for MRI Synthesis and Reconstruction as a member of Imaging and Computational Neuroscience (ICON) Lab.
- **Graduate Teaching Assistant**, Bilkent University, Ankara 2021-Present
  - Math 241: Engineering Mathematics I
  - Math 242: Engineering Mathematics II
- **Research Intern**, TUKL Research and Development Lab, Islamabad 2019
  Worked on the acceleration of Deep Neural Networks on FPGAs.

Academic Achievements

- **Outstanding Cambridge Learner Awards** 2016
  Second highest mark in Islamabad for Best Across three Cambridge International AS Levels.
- **Outstanding Cambridge Learner Awards** 2015
  Highest mark in the world in O-Level Mathematics.
- **Silver Medals**, in the International Kangaroo Mathematics Contest, Pakistan 2011, 2013

Skills

- Programming Languages: C++, Python, MATLAB
- AI: Generative Models, Object Detection, Image Classification
- Frameworks: PyTorch, TensorFlow, OpenCV
- Tools: LaTeX, Inkscape, HTML, CSS, FFmpeg