Seyedeh Nasim Adnani

Graduate Research Assistant, PhD Candidate
Auburn University NeuroImaging Center,
Department of Electrical and Computer Engineering (ECE),
Auburn University, Auburn, AL, USA.
Email: sza0127@auburn.edu
LinkedIn: linkedin.com/in/seyedeh-nasim-adnani-a41b39245

RESEARCH INTEREST

Fast Image Acquisition with Radial/Spiral Trajectory and Adiabatic T2prep for Myelin Water Mapping at ultra-high field MRI, high-resolution spinal cord imaging at ultra-high field with Rosette Trajectory and Compressed Sensing, quantitative MRI in human brain and the spinal cord, White Matter (WM) analysis, T2*-mapping, quantitative magnetization transfer mapping, quantitative susceptibility mapping (QSM), Myelin Water Fraction (MWF) mapping, quantitative analysis of gamma-aminobutyric axis (GABA) - edited magnetic resonance spectroscopy (MRS) data, digital image processing, digital signal processing, Machine Learning for neuroimaging and pathology assessment, Clinical Artificial Intelligence (AI).

EDUCATION

• **PhD** currently pursuing PhD in Electrical and Electronic Engineering at Auburn University, USA (2019-present). Expected graduation date: June 2025.
• **MSNT** Masters (Non-Thesis) in Electrical and Electronic Engineering at Auburn University, USA (2019-present). Expected graduation: June 2025.
• **MS** (Thesis) in Electrical and Electronic Engineering, Tabriz University, Iran (2015-2017).
• **BS** in Electrical and Electronic Engineering, Zanjan University, Iran (2009-2013).

PUBLICATIONS

• **Adnani SN,** Denney T J, Sukstansky A, *et al.* "Application of Voxel Spread Function Method for Correction of Magnetic Field Inhomogeneity at 7T." In Proceedings of 29th Annual Meeting of ISMRM, Vancouver, BC, Canada, 2021. p 3553.
• **Adnani SN,** Mahmud SZ**,** Denney TS, *et al*. "Background Field Inhomogeneity Correction for High-Resolution T2* Mapping of the Human Cervical Spinal Cord at 7T." In Proceedings of 31st Annual Meeting of ISMRM, Toronto, ON, Canada, 2023. p 2103.
• Mahmud SZ**, Adnani SN,** Denney TS, *et al*. "High-Resolution Spinal Cord Imaging at 7T with Rosette Trajectory and Compressed Sensing." In Proceedings of 31st Annual Meeting of ISMRM, Toronto, ON, Canada, 2023. p 2596.
• **Adnani SN,** Denney T J, Bashir A. "Multiparametric Quantitative MRI for Brain White Matter Imaging at 7T Terra. X Using BEAT Sequence." ISMRM Workshop on WHATEVER, 44, Nashville, TN, September 2023.
• Samson G, …, **Adnani SN,** et al. "333. A Longitudinal Assessment of Gamma-Aminobutyric Acid in the Anterior Cingulate Cortex of Antipsychotic Medication-Naïve First Episode Psychosis Patients." Biological Psychiatry, Volume 93, Issue 9, Supplement, 2023.
• **Adnani SN,** Denney TS, Bashir A. "Spinal Cord T2* mapping with Multi-echo Radial Stack of Star Acquisition at 7T." Accepted abstract for ISMRM 2025 in Honolulu, Hawai'i.
• **Adnani SN,** Denney TS, Bashir A. "Region-based and voxel-wise repeatability analysis of quantitative MT and MWF maps in brain white matter at 7T." Accepted abstract for ISMRM 2025 in Honolulu, Hawai'i.
• **Adnani SN,** Denney TS, Bashir A. "Multiparametric Quantitative MRI in Human Brain at 7T Terra.X: A Reproducibility Study of T1, T2*, QSM, qMT, and MWF mapping," 2025. (Under Authors' review. Soon to be submitted to Nature Scientific Reports)

• **Adnani SN,** Denney TS, Bashir A, Deshpande G. "Predicting Brain Parenchymal Fraction in Progressive Multiple Sclerosis Following Ibudilast Treatment Using Support Vector Machine," 2025. (Soon to be submitted)

• Two papers are in the preparation step for non-cartesian magnetization transfer mapping in the brain and spinal cord at 7T.

Poster Presentations

• **Adnani SN,** Mahmud SZ, Denney T J, Bashir A. Background Field Inhomogeneity Correction for High-Resolution T2* Mapping of the Human Cervical Spinal Cord at 7T. In 12th Annual Meeting of Alabama Advanced Imaging Consortium (AAIC), Auburn, Alabama, USA, July 2023.
• Mahmud SZ, **Adnani SN,** Denney T J, Bashir A. High-resolution spinal cord imaging at 7T with Rosette trajectory and compressed sensing. In 12th Annual Meeting of Alabama Advanced Imaging Consortium (AAIC), Auburn, Alabama, USA, July 2023.
• **Adnani SN,** Denney T J, Bashir A. Background field inhomogeneity correction for quantitative T2* mapping and simultaneous multi-contrast imaging at 7T. In 11th Annual Meeting of Alabama Advanced Imaging Consortium (AAIC), Auburn, Alabama, USA, July 2022.
• **Adnani SN,** Denney T J, Bashir A. Phase artifact correction for robust myelin water imaging at 7T. In 11th Annual Meeting of Alabama Advanced Imaging Consortium (AAIC), Auburn, Alabama, USA, July 2022.
• **Adnani SN,** Denney T J, Bashir A. The Feasibility of the Voxel Spread Function Technique for Background Field Inhomogeneity Correction at 7T. In 10th Annual Meeting of Alabama Advanced Imaging Consortium (AAIC), Auburn, Alabama, USA, July 2021.
• **Samson G,** Adnani SN**,** Lahti A, *et al.* A Longitudinal Assessment of Anterior Cingulate Cortex GABA in Antipsychotic Medication-naive First Episode Psychosis Patients. In 10th Annual Meeting of Alabama Advanced Imaging Consortium (AAIC), Auburn, Alabama, USA, July 2021.
• **Adnani SN,** Huynh PN, Deshpande G, Denney T J, Bashir A. Predicting the Future Condition of Primary and Secondary Progressive Multiple Sclerosis Patients Following Ibudilast Treatment Using Machine Learning. presented at the Auburn University Research Symposium, Auburn, Alabama, USA, March 2024.

PROGRAMMING LANGUAGE, SOFTWARE AND TOOLBOX

• Python, MATLAB, R, C/C++, (experience with) Bash, Julia, COMSOL, FSL, FreeSurfer, SPM, BART, Computational Anatomy Toolbox CAT12, xjView, jMRUI, Gannet, SEPIA, Advanced Normalization Tools (**ANTS**), Pulse Sequence Programming with PULSEQ, Pulse Sequence Programming with IDEA, LCModel, Osprey, E-Prime, ADS, SPICE, AutoCAD Electrical.

Certificates

• IRB Additional Modules - HIPAA and Human Subjects Research (ID 51964610)

https://www.citiprogram.org/verify/?waf2d619d-7ff5-41e2-bcb2-2da28c53d90d-51964610

• IRB Additional Modules - History and Ethics of Human Subjects Research (ID 51964612)

https://www.citiprogram.org/verify/?w759bf03d-0f3f-434d-987c-1b9ca22239b8-51964612

• CITI RCR training certificate" Responsible Conduct of Research - AU Basic RCR Training for ALL Faculty, Staff, Postdocs, and Students (ID 54561198)

https://www.citiprogram.org/verify/?wa851f9a7-27cb-4d46-bc97-cf6891a3b9b0-54561198

• IRB #1 Health Science Emphasis - AU Personnel - Basic/Refresher - IRB #1 Health Science Emphasis - AU Personnel (ID 51964611)

https://www.citiprogram.org/verify/?w3775948f-b497-4766-ad14-51bfa41f541a-51964611

• Machine Learning, authorized by Stanford University and offered through Coursera, https://coursera.org/verify/5YYN9QYH6HQW

• Deep Learning Specialization that includes five courses offered through Coursera and DeepLearning.AI:

- Neural Networks and Deep Learning
- Convolutional Neural Networks
- Sequence Models
- Structuring Machine Learning Projects
- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization

https://coursera.org/share/e2324c79c0a8ce01955b9b7e5fdb05e7

• Machine Learning Specialization that includes three courses that are authorized by Stanford University and are offered through Coursera and DeepLearning.AI:

- Supervised Machine Learning: Regression and Classification
- Advanced Learning Algorithms
- Unsupervised Learning, Recommenders, Reinforcement Learning

https://coursera.org/share/392f737bc6dc4ad58932e9ca2bcbc46c

RESEARCH AND PROJECTS

• Radial/Spiral/Rosette Trajectory and Adiabatic T2prep for Myelin Water Mapping.

• Compressed Sensing for MRI Rosette image reconstruction.

- Image reconstruction using under-sampled Rosette acquisition.

• Fast radial acquisition with under-sampled uniform or golden angle projections.

- High-quality Image reconstruction using under-sampled radial acquisition.

• Simultaneous multi-contrast imaging at 7T using a single multi-echo Gradient Echo (mGRE) scan.

- Simultaneously generating the T1 /Proton density-weighted image, frequency map, T2* map, and Susceptibility-weighted images in human brain
- Simultaneously generating the T1-weighted image, frequency map, and the T2* map in human Spinal Cord (SC).

• Quantitative MRI.

- Obtaining quantitative MRI maps in human brain: T2*, MWF, QSM, qMT, and tissue volume.

• Spinal cord imaging.

- High resolution non-cartesian, motion insensitive spinal cord imaging with radial projections at 7T
- MT-prepared spinal cord imaging
- MTR map of human spinal cord
- T2* map of human spinal cord with non-cartesian data

• Reproducibility analysis of quantitative MRI.

- Test-retest data acquisition and analysis of quantitative T2*, MWF, qMT, QSM and T1 maps at 7T.
- Registering quantitative maps to anatomical image space for accurate comparisons by applying nonlinear transformations in ANTsR software
- Image segmentation for ROI analysis in various brain regions (WM, GM, subcortical regions, etc.)
- Statistical analysis

• Functional MRI.
- Pre-processing including functional-structural co-registration and Normalization, spatial and temporal filtering.
- General Linear Modeling (GLM)

• Brain-Map Meta-analysis on Multiple Sclerosis (MS) disease.
- Detecting regions in deep gray matter more susceptible to atrophy than other regions.
- ALE-Map illustration using Ginger-ALE software to report the coordinates most associated with MS literature.
- Identifying the active regions in MS patients versus Healthy Controls (HC) while performing tasks

• Non-Cartesian MR Image Reconstruction
- Reconstructing MR images from multiple projections using the filter back projection, convolution back projection, gridding, and the Nonuniform FFT (NUFFT).

• Magnetic Resonance Spectroscopy (MRS)
- T2 mapping using MRS.
- Quantifying metabolite concentration in the frontal cortex of Schizophrenia patients, including GABA, N-Acetyl Aspartate (NAA), Glutamine and glutamate (Glx), Creatine (Cr), and Choline (Cho)

• Implementing surface spoiling magnetic field gradients for spatial localization in MRI.
- Simulating the static magnetic field in two different geometries of surface coils: meander-line and planar mesh coils
- Predicting the signal

• Image Processing for Detecting Human Motion in Low-quality images with varying illumination
- Denoising, Homographic Filtering, edge detection, image registration, and image segmentation

• Neural Network.
- Designing a Fuzzy Controller with Trapezoidal Membership Function for a control surface. I also designed a neural network controller for the same surface.

• Compressed Sensing for Energy-efficient Wireless Sensor Networks (WSNs)
- Spatiotemporal correlations in WSN measurements utilized for cost-effective sensing.

EXPERIENCE

• **Graduate Research Assistant,** Auburn University MRI Research Center. (August 2019-Present).

- Trained and worked with ultra-high field MRI (7T and 3T).
- VE11E, VB17, XA60, XA61, …

• **Graduate Teaching Assistant,** Department of Electrical and Computer Engineering, Auburn University (August 2019-Present).

- Designing and grading problems for undergraduate students.

• **Graduate Teaching Assistant,** Department of Electrical and Computer Engineering, Tabriz University (August 2015-2018).

- Designed and graded problems and projects for undergraduate students in pattern recognition, digital signal and image processing, and statistics.