

Professional Experience

Postdoctoral Researcher,

Department of *Neurology*,

University of Rochester Medical Center, NY, US

May, 2024 - *Present*

- Conduct cutting-edge research at the intersection of neurology and AI, focusing on applying machine learning to medical imaging for enhanced diagnostic precision.
- Develop and optimize machine learning pipelines for processing complex 3D medical datasets, such as MR angiograms and diffusion MRI.
- Partner with clinicians and domain experts to tailor algorithms for detecting neurological patterns and biomarkers.
- Streamlined data pipelines for MR angiograms and diffusion MRI, cutting analysis time by more than 50%.
- Mentor graduate students and collaborators in implementing advanced machine learning techniques.
- Developing and writing NIH Grant application on the use of AI in diffusion MR and MR Angiogram.

Applied Machine Learning and Medical Imaging Researcher,

Department of *Electrical and Computer Engineering*,

University of Rochester, NY, US

01/2018 - 05/2024

- Designed machine learning frameworks that improved imaging accuracy by more than 18% in healthcare diagnostics.
- Won a MICCAI challenge on AI for diffusion MRI in clinical validation of migraine population.
- Partnered with cross-functional teams to analyze datasets impacting 10+ healthcare projects.
- Optimized processing pipelines, reducing computation time by 40% and supporting faster clinical decisions.
- Contributed to 10 conference presentations and 11 publications, advancing medical AI methodologies.

Journal/Conference Peer Review on Medical Imaging & AI,

ISMRM, NMR in Biomedicine, Frontiers in Neurology, PLOS ONE

03/2022 - *Present*

- Reviewed 25+ journal and conference submissions, improving the quality of published medical AI research.
- Influenced the work of over 100 authors by providing actionable feedback on methodologies.
- Advised on experimental design improvements, leading to 15 successfully revised manuscripts.

Lecturer, Department of *Computer Science and Engineering*,

Islamic University of Technology, Dhaka, Bangladesh

01/2017 - 01/2018

- Taught 4 advanced courses to 150+ students, achieving a 95% satisfaction score in evaluations.
- Guided 6 student AI and software engineering projects
- Introduced machine learning concepts in curricula, preparing students for industry demands.

Co-op Internship, Software Solutions Department

Samsung R&D Institute, Bangladesh, Dhaka





10/2015 - 01/2016

- Developed location-prediction models for mobile devices, improving accuracy by 25% in indoor tracking.
 - Enhanced real-time data processing modules, reducing latency by 60% for deployment-ready applications.
 - Collaborated with a cross-functional team of 7, impacting Samsung's R&D efforts globally.
 - Presented findings to senior stakeholders, influencing strategic decisions in mobile AI solutions.
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Education

PhD (Electrical & Computer Engineering) <i>University of Rochester, NY, United States</i> Specialization: Neuroimaging, Artificial Intelligence	May, 2024
MS (Electrical & Computer Engineering) <i>University of Rochester, NY, United States</i> Specialization: Data Science, Medical Imaging	05/13/2022
BSc (Computer Science and Engineering) First class with Honors (Ranked 1st), Islamic University of Technology, Bangladesh. CGPA: 4.0/4.0 Specialization: Machine Learning, Ultrasound	08/2012 - 11/2016

Awards & Achievements

 Achieved MR IDEA Image Calculation Programming Certification from Siemens Healthineers	03/2025
 Champion in the MICCAI Challenge 2022 , International Competition on Artificial Intelligence in diffusion MRI organized by CDMRI & MICCAI Society. [Challenge Results] [Details]	09/2022
 Received OIC Gold Medal 2016 award for academic excellence in BSc., International Award recognised by Organisation of Islamic Cooperation, Jeddah, Kingdom of Saudi Arabia	11/2016
 Awarded Educational Stipend in the ISMRM Conference , International Society for Magnetic Resonance in Medicine.	2020, 2021, 2022, 2024, 2025
 First Runners Up at 16th IUT Programming Contest 2015. , Programming contest organized by Islamic University of Technology, Dhaka, Bangladesh	11/2015

Research Publications

Journal Articles (Peer Reviewed)

- J1.** Parker, K. J., Kabir, I. E., Doyley, M. M., **Faiyaz, A.**, Uddin, M. N., Flores, G., Schifitto, G., “Brain elastography in aging relates to fluid/solid trendlines,” en, *Physics in Medicine & Biology*, vol. 69, no. 11, p. 115 037, May 2024, Publisher: IOP Publishing.
- J2.** Uddin, M. N., Singh, M. V., **Faiyaz, A.**, Szczepankiewicz, F., Nilsson, M., Boodoo, Z. D., Sutton, K. R., Tivarus, M. E., Zhong, J., Wang, L., Qiu, X., Weber, M. T., Schifitto, G., “Tensor-valued diffusion MRI detects brain microstructural abnormalities in HIV infected individuals with cognitive impairment,” en, *Scientific Reports*, vol. 14, no. 1, p. 28 839, Nov. 2024, Publisher: Nature Publishing Group.
- J3.** Aja-Fernández, S., Martín-Martín, C., Planchuelo-Gómez, Á., **Faiyaz, A.**, Uddin, M. N., Schifitto, G., et, al, “Validation of deep learning techniques for quality augmentation in diffusion MRI for clinical studies,” *NeuroImage: Clinical*, vol. 39, p. 103 483, Jan. 2023.
- J4.** **Faiyaz, A.**, Doyley, M. M., Schifitto, G., Uddin, M. N., “Artificial intelligence for diffusion mri-based tissue microstructure estimation in the human brain: An overview,” *Frontiers in Neurology*, vol. 14, p. 1 168 833, 2023.
- J5.** **Faiyaz, A.**, Doyley, M., Schifitto, G., Zhong, J., Uddin, M. N., “Single-shell noddI using dictionary-learner-estimated isotropic volume fraction,” *NMR in Biomedicine*, vol. 35, no. 2, e4628, 2022.

- J6.** Finkelstein, A., **Faiyaz, A.**, Weber, M. T., Qiu, X., Uddin, M. N., Zhong, J., Schifitto, G., “Fixel-based analysis and free water corrected dti evaluation of hiv associated neurocognitive disorders,” *Frontiers in Neurology*; <https://doi.org/10.3389/fneur.2021.725059>, 2021.
- J7.** Uddin, M. N., **Faiyaz, A.**, Wang, L., Zhuang, Y., Murray, K. D., Descoteaux, M., Tivarus, M. E., Weber, M. T., Zhong, J., Qiu, X., “A longitudinal analysis of brain extracellular free water in hiv infected individuals,” *Scientific reports*, vol. 11, no. 1, pp. 1–12, 2021.
- J8.** Diba, T., **Faiyaz, A.**, Akhlagi, N., Doyley, M., Alam, S. K., Zara, J., Garra, B., “Elastic modulus quantification from strain elastograms: Progress towards a low cost alternative to shear wave elastography,” *Journal of Ultrasound in Medicine*, vol. 39, no. S1, S26–S31, 2020.
- J9.** Korshunov, V. A., Smolock, E. M., Wines-Samuelson, M. E., **Faiyaz, A.**, Mickelsen, D. M., Quinn, B., Pan, C., Dugbartey, G. J., Yan, C., Doyley, M. M., “Natriuretic peptide receptor 2 locus contributes to carotid remodeling,” *Journal of the American Heart Association*, vol. 9, no. 10, e014257, 2020.
- J10.** Korshunov, V. A., Quinn, B., **Faiyaz, A.**, Ahmed, R., Sowden, M. P., Doyley, M. M., Berk, B. C., “Strain-selective efficacy of sacubitril/valsartan on carotid fibrosis in response to injury in two inbred mouse strains,” *British Journal of Pharmacology*, vol. 176, no. 15, pp. 2795–2807, 2019.

Journal Articles (Under Preparation)

- J11.** **Faiyaz, A.**, Hoang, N., Uddin, M., Schifitto, G., *Arteryx, advancing brain artery feature extraction with vessel-fused network and validation framework.*
- J12.** **Faiyaz, A.**, Kabir, I., L, W., Doyley, M., Sack, I., Qiu, X., Uddin, M., Schifitto, G., *Magnetic resonance elastography investigation on hiv+ cohort with cerebral small vessel disease.*
- J13.** **Faiyaz, A.**, Uddin, M. N., Schifitto, G., *Angular upsampling in diffusion mri using contextual hemihex sub-sampling in q-space.*
- J14.** Uddin, M. N., **Faiyaz, A.**, Wang, L., Tivarus, M., Zhong, J., Wang, H., Weber, M., Qiu, X., Schifitto, G., *Fractional anisotropy detects microstructural changes in hiv- infected individuals.*

Conference Proceedings (Peer Reviewed)

- C1.** **Faiyaz, A.**, Hoang, N., Schifitto, G., Uddin, M. N., “Arteryx: Enhancing sensitivity in brain artery feature extraction using arterial graph network,” in *Proc. Intl. Soc. Mag. Reson. Med.* 33, 2025.
- C2.** **Faiyaz, A.**, Weber, M., Kabir, I., Doyley, M. M., Sack, I., Uddin, M. N., Schifitto, G., “Evaluating mre-tract integrity in hiv-csvd cohort: A comprehensive analysis with functionally defined atlases and neurocognitive assessment,” in *Proc. Intl. Soc. Mag. Reson. Med.* 32, 2024.
- C3.** **Faiyaz, A.**, Hoang, N., Finkelstein, A., Zhong, J., Doyley, M., Wang, H., Uddin, M. N., Schifitto, G., “Bayesttract: Automated machine learning based brain artery segmentation, anatomical prior annotation and feature-extraction in mr angiography,” in *Proc. Intl. Soc. Mag. Reson. Med.* 30, 2022.
- C4.** Uddin, M. N., **Faiyaz, A.**, Finkelstein, A., Schifitto, G., “Myelin water imaging in an hiv population at risk of cerebral small vessel disease,” in *Proc. Intl. Soc. Mag. Reson. Med.* 30, 2022.
- C5.** **Faiyaz, A.**, Doyley, M. M., Schifitto, G., Zhong, J., Uddin, M. N., “Deep learner estimated isotropic volume fraction enables reliable single-shell noddi reconstruction,” in *Proc. Intl. Soc. Mag. Reson. Med.* 29, 2021.
- C6.** **Faiyaz, A.**, Kabir, I. E., Doyley, M. M., Sack, I., Uddin, M. N., Schifitto, G., “Preliminary mr elastomergraphy investigation on hiv+ cohort with cerebral small vessel disease,” in *Proc. Intl. Soc. Mag. Reson. Med.* 29, 2021.
- C7.** Finkelstein, A., **Faiyaz, A.**, Uddin, M., Zhong, J., Schifitto, G., “Machine learning classification of hiv associated neurocognitive disorders (hand) based on fiber specific white matter change,” in *27th Annual Meeting of the Organization for Human Brain Mapping*, 2021.

- C8.** Uddin, M. N., **Faiyaz, A.**, Schifitto, G., “Evaluation of white matter microstructure in an hiv population at risk of cerebral small vessel disease using microscopic fractional anisotropy,” in *Proc. Intl. Soc. Mag. Reson. Med.* 29, 2021.
- C9.** **Faiyaz, A.**, Zhuang, Y., Dooley, M., Zhong, J., Descoteaux, M., MN, U., Schifitto, G., “Effect of free water correction in grey and white matter in cart treated hiv patients,” in *26th Annual Meeting of the Organization for Human Brain Mapping*, 2020.
- C10.** Murray, K., **Faiyaz, A.**, Sahin, B., Tivarus, M., Uddin, M. N., Venkataraman, A., Wang, H., Zhuang, Y., Zhong, J., Maggirwar, S., “Tract-based spatial statistics of cerebral small vessel disease in an hiv population,” in *26th Annual Meeting of the Organization for Human Brain Mapping*, 2020.
- C11.** Uddin, M. N., **Faiyaz, A.**, Zhuang, Y., Tivarus, M., Zhong, J., Descoteaux, M., Schifitto, G., “Relationship between free water and neuroinflammation/neurodegeneration markers in hiv before and after combination antiretroviral therapy,” in *Proc. Intl. Soc. Mag. Reson. Med.* 28, 2020.
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Graduate Thesis

Abrar Faiyaz 2024, “Artificial Intelligence in Brain Micro-Architecture Investigation Using Clinical Diffusion MRI”, University of Rochester, Rochester, NY, US

- Proposed a competitive approach for Q-space up-sampling problem in diffusion MRI that won MICCAI challenge 2022.
- Enabled single-shell neurite characterization using AI based neurite orientation and dispersion imaging.
- Demonstrated application of the proposed approaches in the clinical diffusion MRI.

Undergraduate Thesis

Abrar Faiyaz, Md Samiul Bashar, et al. 2016, “Strain Estimation and Detection of Cancerous Breast Lesion through ultrasound imaging”, Department of CSE, IUT, Dhaka, Bangladesh.

- Extracted and analyzed key features of malignant mammograms.
- Applied ML classifiers on optimized set of features to identify malignant and benign cases.
- Enabled early detection of malignant incidents.

Academic Projects

Analyzing AlexNet Encodings: In a Computational Neuroscientist’s Perspective

Course Instructor: Ralf Haefner

Spring 2021, **BCS451**

- o Reconstructed Neuronal Receptive Fields of AlexNet Convolution Layer Neurons.
- o Investigated alexnet tuning curves for comparison with neurons in human visual pathway.
- o [Report/Presentation](#)

Deep learning based Ultrasound Image Generation Beam forming alternative Limitations and Possibilities

Course Instructor Kevin J. Parker, ECE

Fall 2018, **ECE452**

- o Enabled Ultrasound Beam forming with trained Unet architecture.
 - o Explored possibilities for Ultrasound Images with Deep Learner Applications.
 - o Enabled characterizing Cysts with segmentation using raw US data without beam forming.
 - o [Report/Presentation](#)
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Skills

Languages: C/ C++, Python, Keras, R, Bash, Matlab, \LaTeX , Assembly (x86, MIPS), ImageJ, ANTS

Simulation Tools: COMSOL, Field-II, Paraview, Blender

Others: Git, High Performance computing, Cluster computing

Research Interest (Keywords)

Machine Learning, Deep Learning, Diffusion MRI, MR Elastography, MR Physics, Tissue Mechanics, Medical Image Processing, Computer Vision, Image Restoration, Ultrasound

References

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