

Abrar Faiyaz

Postdoctoral Researcher, Department of Neurology, UPMC

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Education

- **Ph.D. in Electrical and Computer Engineering (ECE)**. Date: May 2024.
University of Rochester, Rochester, NY
Specialization: Neuroimaging, Artificial Intelligence.
Dissertation: Artificial Intelligence in Brain Micro-Architecture Investigation Using Clinical Diffusion MRI.
 - **M.S. in Electrical and Computer Engineering (ECE)**. Date: May 2022.
University of Rochester, Rochester, NY
Specialization: Data Science, Medical Imaging.
 - **B.Sc. in Computer Science and Engineering (CSE)**. Date: Aug. 2012 – Nov. 2016.
Islamic University of Technology, Dhaka, Bangladesh
First Class with Honors; ranked 1st; CGPA: 4.0/4.0. Specialization: Machine Learning, Ultrasound.
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Research Interests

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| • MRA/CTA | • Deep Learning | • Vascular Remodeling | • MR Elastography |
| • Medical Image Processing | • Tissue Mechanics | • Image Registration | • MR Physics |
| • Machine Learning | • Diffusion MRI | • Computer Vision | • Artery Hemodynamics |
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Awards and Honors

- **MR IDEA Image Calculation Programming Certification**. Mar. 2025. Siemens Healthineers.
 - **Champion, MICCAI Challenge 2022**. Sept. 2022. International competition on artificial intelligence in diffusion MRI, organized by CDMRI and the MICCAI Society. [Challenge results](#); [details](#).
 - **OIC Gold Medal**. Nov. 2016. Awarded for academic excellence in BSc studies by the Organisation of Islamic Cooperation, Jeddah, Kingdom of Saudi Arabia.
 - **ISMRM Educational Stipend**. 2020, 2021, 2022, 2024, 2025. International Society for Magnetic Resonance in Medicine.
 - **First Runner-Up, 16th IUT Programming Contest**. Nov. 2015. Programming contest organized by Islamic University of Technology, Dhaka, Bangladesh.
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Journal Publications

- J1.** Faiyaz, A., Hoang, N., Schifitto, G., Uddin, M. N., “ArteryX: A Reliable End-To-End Toolbox for Standardized Intracranial Artery Feature Extraction From 3D TOF-MRA,” *Magnetic Resonance in Medicine*, 2026.
- J2.** Faiyaz, A., Uddin, M. N., Schifitto, G., “Estimation of Blood Velocity from TOF-MRA Arterial Centerlines: Theory, Simulation, and Inverse Solution,” *Bioengineering*, vol. 13, no. 8, p. 954, Aug. 2026.
- J3.** Qiu, X., Uddin, M. N., Wang, L., Tyrell, A., Faiyaz, A., Hoang, N., Zhuang, Y., Tivarus, M. E., Zhong, J., Weber, M. T., Schifitto, G., “A multimodal imaging-based integrative framework for HIV-associated cognitive impairment and treatment response,” *Frontiers in Neuroscience*, vol. 20, p. 1775 047, Apr. 2026.
- J4.** Uddin, M. N., Faiyaz, A., Figley, C. R., Qiu, X., Weber, M. T., Schifitto, G., “HIV-Associated Microstructural Abnormalities in Default Mode, Executive Control, and Salience Networks: Insights from Tensor-Valued Diffusion Encoding,” *Bioengineering*, vol. 13, no. 4, p. 413, Apr. 2026.

- J5.** 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.
- J6.** 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.
- J7.** 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.
- J8.** **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.
- J9.** **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.
- J10.** 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.
- J11.** 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.
- J12.** 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.
- J13.** Korshunov, V. A., Smolock, E. M., Wines-Samuels, 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.
- J14.** 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.

Conference Publications

- C1.** **Faiyaz, A.**, Hoang, N., Mensah, E., Ramezani, N., Schifitto, G., Uddin, M. N., “HIV-Associated Arterial Remodeling Phenotypes Differ Based on Comorbid CSVD Status: ArteryX and iCafe analysis,” in *Proc. Intl. Soc. Mag. Reson. Med.* 34, 2026.
- C2.** Hoang, N., **Faiyaz, A.**, Zhong, J., Schifitto, G., Uddin, M. N., “Enhanced Intravoxel Incoherent Motion three-compartmental modeling using fusion neural network,” in *Proc. Intl. Soc. Mag. Reson. Med.* 34, 2026.
- C3.** Mensah, E., **Faiyaz, A.**, Finkelstein, A. J., Schifitto, G., Uddin, M. N., “Enhanced Snapshot GRE-CEST Reconstruction Using Combined L1 and Local Low-Rank Regularization,” in *Proc. Intl. Soc. Mag. Reson. Med.* 34, 2026.
- C4.** Mensah, E., **Faiyaz, A.**, Finkelstein, A. J., Schifitto, G., Uddin, M. N., “Lorentzian-Optimized Frequency-Offset-Dependent Sampling for Accelerated CEST MRI,” in *Proc. Intl. Soc. Mag. Reson. Med.* 34, 2026.

- C5. **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.
- C6. **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.
- C7. **Faiyaz, A.**, Hoang, N., Finkelstein, A., Zhong, J., Doyley, M., Wang, H., Uddin, M. N., Schifitto, G., “BayesTract: 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.
- C8. 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.
- C9. **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.
- C10. **Faiyaz, A.**, Kabir, I. E., Doyley, M. M., Sack, I., Uddin, M. N., Schifitto, G., “Brain MR Elastography Metrics Associated with Learning and Memory Deficits in People with HIV,” in *Proc. Intl. Soc. Mag. Reson. Med.* 29, 2021.
- C11. 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.
- C12. 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.
- C13. **Faiyaz, A.**, Zhuang, Y., Doyley, 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.
- C14. 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.
- C15. 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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Publications Under Review

- J1. **Faiyaz, A.**, Kabir, I., L, W., Doyley, M., Sack, I., Qiu, X., Uddin, M., Schifitto, G., “Brain MR Elastography Metrics Associated with Alterations in Learning and Memory in People with HIV (Submitted: Scientific Reports).”
- J2. **Faiyaz, A.**, Uddin, M. N., Schifitto, G., “Angular upsampling in diffusion MRI using contextual HemiHex sub-sampling in q-space.”
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Research Skills

Programming and Analysis: Python, C/C++, R, Bash, Matlab, Keras, L^AT_EX, Assembly (x86, MIPS), ImageJ, ANTs

Medical Imaging and Simulation: dMRI, MRA/CTA, CEST, IVIM, COMSOL, Field-II, ParaView, Blender

Research Computing: Git, high-performance computing, cluster computing, reproducible research workflows

Research Experience

Postdoctoral Researcher. Dates: May 2024 – Present.

Department of Neurology

University of Rochester Medical Center, Rochester, NY

- Developing AI methods for vascular feature extraction and quantitative MRA/CTA analysis for NIH K99/R00 grant preparation.
- Built [ArteryX](#), an end-to-end intracranial artery processing toolbox for standardized segmentation, annotation, and feature extraction from CTA/MRA; published in *Magnetic Resonance in Medicine*.
- Collaborate with neurologists and domain experts to tailor AI algorithms for neurological biomarkers and clinically meaningful imaging patterns.

Applied Machine Learning and Medical Imaging Researcher. Dates: Jan. 2018 – May 2024.

Department of Electrical and Computer Engineering

University of Rochester, Rochester, NY

- Won the MICCAI 2022 challenge on AI for diffusion MRI, with clinical validation on a migraine cohort.
 - Optimized medical-imaging processing pipelines, reducing computation time by 40% and supporting faster clinical analysis.
 - Contributed to 10 conference presentations and 11 peer-reviewed publications in medical AI and neuroimaging.
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Teaching Experience

Lecturer. Dates: Jan. 2017 – Jan. 2018.

Department of Computer Science and Engineering

Islamic University of Technology, Dhaka, Bangladesh

- Taught 4 advanced courses to 150+ undergraduate students.
 - Guided 6 student projects in AI and software engineering.
 - Introduced machine learning concepts into course materials to prepare students for research and industry applications.
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Mentorship

Graduate Students

- **Emmanuel Mensah** (CEST and DL/AI)
- **Raiyun Rajin Kabir** (Clinical Diffusion MRI and DL/AI)
- **Bin Hoang** (IVIM Simulation)
- **Alan Finkelstein** (Synthetic Data Simulation in Diffusion MRI)

Undergraduate Students

- **Ellie Wu** (CEST Simulation)
 - **Frances Lovett** (Structural Connectome)
 - **Timmie Li** (CEST Liver)
 - **Meghana Kunamneni** (MR Angiography Methods)
-

Academic Service

Journal and Conference Peer Reviewer. Dates: Mar. 2022 – Present.

Medical Imaging and Artificial Intelligence

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

- Reviewed 25+ journal and conference submissions in medical imaging and AI.
 - Advised on experimental design and methodological clarity for revised manuscripts.
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Professional Experience

Founder/CEO. Dates: Jan. 2025 – Present.

FLY AI Solutions LLC

Rochester, NY

- Develop applied AI solutions for business workflows, academic productivity, and domain-specific software products.
- Build software tools for F-1 students and provide consultation on practical AI adoption.
- Company website: flyai.online.

Co-op Intern. Dates: Oct. 2015 – Jan. 2016.

Software Solutions Department

Samsung R&D Institute, Dhaka, Bangladesh

- Developed location-prediction models for mobile devices, improving indoor tracking accuracy by 25%.
 - Enhanced real-time data processing modules, reducing latency by 60% for deployment-ready applications.
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References

Marvin M. Doyley, Ph.D.

Wilson Professor of Electronic Imaging
Dept. of Electrical and Computer
Engineering, Hajim School, University of
Rochester
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Giovanni Schifitto, M.D.

Esther Aresty Granite Professor in
Neurology
Dept. of Neurology, School of Medicine and
Dentistry, URM
Tel: (585) 275-1870
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Md Nasir Uddin, Ph.D.

Assistant Professor in Neurology
Dept. of Neurology, School of Medicine and
Dentistry, URM
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