Khalid Saifullah

📍 Chicago, IL | ✉️ ksaifullah@hawk.illinoistech.edu | 📱 +1 (773) 886-9567
Website | LinkedIn | GitHub | ResearchGate | GoogleScholar

Education

Ph.D. in Biomedical Engineering (Medical Imaging) - Illinois Institute of Technology, Chicago, IL
Aug 2020 - Expected April 2026
Dissertation: *Neuroimaging Biomarkers of Alzheimer's Disease Neuropathologic Change*

- Advisor: Prof. Konstantinos Arfanakis (Director, Medical Imaging & AI Research Center; Biomarker/Neuroimaging Core Leader, Rush Alzheimer's Disease Center).
- Collaborative research with the Rush Alzheimer's Disease Center on NIH grant-funded studies (NIA/NINDS).

B.Sc. in Electrical and Electronic Engineering - Islamic University of Technology (IUT), Bangladesh
Dec 2013 - Nov 2017

- OIC Merit Based Scholarship (4 years) - Top 3% in competitive entrance exam.

Research Interests

- **Translational Neuroimaging:** Biomarker development using in-vivo and ex-vivo MRI to characterize age-related neuropathologies (AD, LATE, CAA, Arteriolosclerosis, Atherosclerosis, Lewy body).
- **Multimodal Integration:** Integrating MRI, PET, blood-based biomarkers, cognition, and neuropathology to improve diagnosis, monitoring, and differential characterization of neurodegenerative and vascular diseases.
- **Medical AI:** Build machine learning and deep learning pipelines for clinical prediction across multi-site cohorts.
- **Disease Progression:** Longitudinal modeling of multimodal biomarkers to predict cognitive decline.
- **Heterogeneity, Reserve and Resilience:** Genetic and sex-specific drivers of AD heterogeneity and resilience/reserve phenotypes.

Research Experience

Graduate Research Assistant - Magnetic Resonance Imaging Lab at the Illinois Institute of Technology (MRIIT)
Jan 2021 - Present

- **In-Vivo MRI-Based Tangles Marker:** *Manuscript in preparation; Abstracts ISMRM | OHBM | AAIC | RSNA*
  - Biomarker: Built a deployable, containerized MRI biomarker that produces individualized neurofibrillary tangle scores from MRI inputs with reproducible end-to-end automation.
  - Ex-vivo Model Training: Trained a machine-learning stacked-ensemble classifier (SVM/XGBoost/Random Forest) using ex-vivo MRI and neuropathology data.
  - Feature Translation: Used linear mixed-effects models to map in-vivo MRI features to ex-vivo MRI, accounting for multi-site/scanner variability.
  - Multi-cohort Validation: Validated across Rush/ADNI/NACC with cognition, blood and PET.
  - Software packaging: Packaged the end-to-end pipeline as standalone containerized software.
- **Brain Morphometry Patterns of Mixed AD/LATE:** *Paper in review; Abstracts ISMRM | OHBM | AAIC | RSNA*
  - AD±/LATE± Signatures: Integrated voxel-wise Deformation-Based Morphometry (DBM) with neuropathology to define independent and co-occurring morphometric signatures of AD and LATE.
  - Preclinical Validation: Replicated AD±/LATE± DBM signatures in a non-demented subgroup, strengthening relevance for early neurodegeneration.
  - Statistical Modeling: Performed hypothesis-driven testing to disentangle AD vs. LATE effects on hippocampal neurodegeneration using covariate-adjusted regression with an AD×LATE interaction term.
- **Subcortical Volume & Shape Signature:** *Published in Human Brain Mapping; Abstracts ISMRM | OHBM | AAIC*
  - Pathology-Shape Signatures: Integrated ex-vivo MRI with neuropathology to disentangle the independent effects of comorbid pathologies (AD, LATE, vascular, Lewy body) across six deep gray matter structures.
  - Shape Analysis: Applied SPHARM-PDM surface modeling to quantify localized vertex-wise deformations, then tested pathology effects using vertex-wise linear regression with permutation-based inference.
  - Volume Analysis: Automated multi-structure segmentation/volumetry to derive regional volumes; tested pathology-volume associations via covariate-adjusted linear regression with permutation-based inference.
- **Neuropathological Correlates of Regional White Matter Hyperintensities (WMH):** *Manuscript in preparation*

    - WMH Quantification: Quantified periventricular vs. deep WMH across 10 brain regions using an automated segmentation pipeline.
    - WMH Pattern: Linked regional WMH patterns to neuropathologies using covariate-adjusted regression with permutation inference, informing MRI-derived pathology markers and disease progression models.
- **Longitudinal Modeling of ARTS** (in-vivo MRI marker of cerebral arteriolosclerosis): *Manuscript in preparation*
    - Longitudinal Trajectories: Modeled within-person ARTS trajectories across longitudinal MRI using linear mixed-effects models with time×risk-factor interactions.
    - Clinical Relevance: Integrated MRI with clinical and vascular phenotypes to test how vascular risk and disease burden relate to progressive microvascular injury.
- **Plasma Neurofilament Light (NfL), WMH & Brain Morphometry:** *Abstracts ISMRM | OHBM | AAIC | RSNA*
    - Biomarker Association: Linked plasma NfL to MRI markers of neurodegeneration (DBM) and vascular brain injury (WMH) in non-demented people, informing biomarkers of brain health & disease progression.
- **Voxel-wise DBM signatures of Arteriolosclerosis and comorbid pathologies:** *Manuscript in preparation*
    - DBM Signatures: Conducted hypothesis-driven voxel-wise DBM analyses of arteriolosclerosis, including stage-wise contrasts to map progression-related effects.
    - Comorbidity Stratification: Performed cross-classified subgroup comparisons across joint pathology categories (arteriolosclerosis with AD/LATE/atherosclerosis) to assess comorbidity-dependent patterns.

Teaching Experience

Graduate Teaching Assistant - Department of Biomedical Engineering, Illinois Institute of Technology
Jan 2022 - May 2022

- Facilitated student success in BME 553 (Neuroimaging) by providing one-on-one technical support for assignments and final projects.
- Evaluated experimental designs and assisted in troubleshooting analysis concepts, including MRI pulse sequences, fMRI preprocessing (SPM/GLM), diffusion metrics, and tractography.

Lecturer - Department of Electrical and Electronic Engineering, Eastern University, Bangladesh
Sept 2018 - Aug 2020

- Instructed undergraduate courses in Biomedical Signal Processing and Digital Image Processing, guiding students through theoretical concepts and lab-based exercises.
- Served as an Institutional Quality Assurance Cell (IQAC) Member, contributing to departmental curriculum development and continuous improvement strategies.

Journal Publications

- **Saifullah K**, Makkinejad N, Yasar MT, et al. *Neuropathological Correlates of Volume and Shape of Deep Gray Matter Structures in Community-Based Older Adults*. Hum Brain Mapp. 2025;46(10):e70273. doi:10.1002/hbm.70273

Oral Presentations

- **Saifullah, K.**, et al. *Investigating spatial characteristics of brain atrophy in Alzheimer's and LATE neuropathology.* Alzheimer's Association International Conference (AAIC)**,** Oral Presentation, July 28 - Aug 1, 2024, Philadelphia, PA, USA.
- **Saifullah, K.**, et al. *Difference in the spatial pattern of brain atrophy associated with Alzheimer's and LATE neuropathology.* International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting**,** Oral Presentation, May 4-9, 2024, Singapore.
- **Saifullah, K.**, et al. *Towards Classification of Neurofibrillary Tangles with MRI-Based Biomarker.* Radiological Society of North America (RSNA), 108th Scientific Assembly and Annual Meeting**,** Oral Presentation, Nov 27 - Dec 1, 2022, Chicago, IL, USA.
- **Saifullah, K.**, et al. *Neurofibrillary Tangles Prediction Based on MRI.* Alzheimer's Association International Conference (AAIC)**,** Oral Presentation, July 31 - Aug 4, 2022, San Diego, CA, USA.
- **Saifullah, K.**, et al. *Towards an MRI-based Prediction of Neurofibrillary Tangles.* ISMRM-ESMRMB & ISMRT Joint Annual Meeting**,** Oral Presentation, May 7-12, 2022, London, UK.

Poster Presentations

- **Saifullah, K.**, et al. *Plasma Neurofilament Light Reflects Brain Tissue Loss, Ventricular Enlargement, and Vascular-Mediated Neurodegeneration.* Poster Presentation**,** Radiological Society of North America (RSNA), 111th Scientific Assembly and Annual Meeting**,** Nov 30 - Dec 4, 2025, Chicago, IL, USA.
- Chowdhury, G. M., **Saifullah, K.**, et al. *Higher ARTS Score Is Associated with Higher Levels of NfL but Not with p-Tau217.* Poster Presentation**,** Radiological Society of North America (RSNA), 111th Scientific Assembly and Annual Meeting**,** Nov 30 - Dec 4, 2025, Chicago, IL, USA.
- **Saifullah, K.**, et al. *Plasma Neurofilament Light Links to Brain Tissue Loss, Ventricular Enlargement, and Elevated White Matter Hyperintensities.* Poster Presentation, Alzheimer's Association International Conference (AAIC) Annual Meeting**,** July 27-31, 2025, Toronto, Canada.
- Chowdhury, G. M., **Saifullah, K.**, et al. *ARTS is associated with NfL but not with p-Tau217.* Poster Presentation, Alzheimer's Association International Conference (AAIC) Annual Meeting**,** July 27-31, 2025, Toronto, Canada.
- **Saifullah, K.**, et al. *Plasma Neurofilament Light Reflects White Matter Hyperintensity-Driven Neurodegeneration in Aging.* Poster Presentation, Organization for Human Brain Mapping (OHBM) Annual Meeting**,** June 24-28, 2025, Brisbane, Australia.
- Chowdhury, G. M., **Saifullah, K.**, et al. *Elevated ARTS Scores Correlate with Increased NfL Levels but Not p-Tau217.* Poster Presentation, Organization for Human Brain Mapping (OHBM) Annual Meeting**,** June 24-28, 2025, Brisbane, Australia.
- **Saifullah, K.**, et al. *Plasma Neurofilament Light is associated with less brain tissue, larger ventricles, and higher white matter hyperintensities volume.* Poster Presentation, ISMRM & ISMRT Annual Meeting & Exhibition**,** May 10-15, 2025, Honolulu, Hawai'i, USA.
- **Saifullah, K.**, et al. *Brain atrophy in Alzheimer's and LATE neuropathology.* Poster Presentation, Radiological Society of North America (RSNA), 109th Scientific Assembly and Annual Meeting**,** Dec 1-5, 2024, Chicago, IL, USA.
- **Saifullah, K.**, et al. *Spatial pattern of brain atrophy in Alzheimer's and LATE neuropathology.* Poster Presentation, Organization for Human Brain Mapping (OHBM) Annual Meeting**,** June 23-27, 2024, Seoul, Korea.
- **Saifullah, K.**, Makkinejad, N.**,** et al. *Subcortical shapes and age-related neuropathologies.* Poster Presentation, Organization for Human Brain Mapping (OHBM) Annual Meeting**,** July 22-26, 2023, Montréal, Canada.
- **Saifullah, K.**, Makkinejad, N.**,** et al. *Associations of subcortical shapes with age-related neuropathologies in community-based older adults.* Poster Presentation, Alzheimer's Association International Conference (AAIC) Annual Meeting**,** July 16-20, 2023, Amsterdam, Netherlands.
- **Saifullah, K.**, Makkinejad, N.**,** et al. *Associations of the shape of subcortical brain structures with age-related neuropathologies in community-based older adults.* Poster Presentation, ISMRM & ISMRT Annual Meeting & Exhibition**,** June 3-8, 2023, Toronto, Canada.
- **Saifullah, K.**, et al. *MRI-based Neurofibrillary Tangles Prediction.* Poster Presentation, Organization for Human Brain Mapping (OHBM) Annual Meeting**,** June 19-23, 2022, Glasgow, Scotland.

Manuscripts in Preparation

- **Saifullah, K.**, et al. *Brain Morphometry Patterns in the Presence of Alzheimer's and/or Limbic-Predominant Age-Related TDP-43 Encephalopathy (LATE) Neuropathology.*
- **Saifullah, K.**, et al. *An MRI-Based In-vivo Marker for Neurofibrillary Tangles in Alzheimer's Disease.*
- Chowdhury, G. M., **Saifullah, K.**, et al. *Associations of Lobar, Periventricular and Deep White Matter Hyperintensities with Age-Related Neuropathologies in Community-Based Older Adults.*

Conference Abstracts Under Review

- **Saifullah, K.**, et al. *An MRI-Based Marker of Braak Stage.* Alzheimer's Association International Conference (AAIC) Annual Meeting, July 12-15, 2026, London, United Kingdom.
- Tomash, A., **Saifullah, K.**, et al. *Older Age and Heart Disease Are Associated with a Faster Increase In ARTS*. Alzheimer's Association International Conference (AAIC) Annual Meeting, July 12-15, 2026, London, United Kingdom.
- Chowdhury, G. M., **Saifullah, K**., et al. *Associations of Lobar, Periventricular and Deep White Matter Hyperintensities with age-related neuropathologies.* Alzheimer's Association International Conference (AAIC) Annual Meeting, July 12-15, 2026, London, United Kingdom.

- Tomash, A., **Saifullah, K.**, et al. *Older Age and Heart Disease are Associated with a Faster Increase in ARTS*. Organization for Human Brain Mapping (OHBM) Annual Meeting**,** June 14-18, 2026, Bordeaux, France.
- Chowdhury, G. M., **Saifullah, K.**, et al. *Regional White Matter Hyperintensities and Age-Related Neuropathologies.* Organization for Human Brain Mapping (OHBM) Annual Meeting**,** June 14-18, 2026, Bordeaux, France.
- Tomash, A., **Saifullah, K.**, et al. *Older Age and Heart Disease are Associated with a Faster Increase in ARTS, an In-Vivo Marker of Cerebral Arteriolosclerosis*. ISMRM & ISMRT Annual Meeting & Exhibition**,** May 9-14, 2026, Cape Town, South Africa.
- Chowdhury, G. M., **Saifullah, K.**, et al. *Association of regional white matter hyperintensities with age-related neuropathologies*. ISMRM & ISMRT Annual Meeting & Exhibition**,** May 9-14, 2026, Cape Town, South Africa.

Awards & Honors

- **Magna Cum Laude Merit Award, ISMRM 2024** - awarded to the top 15% of presenters.
- **Conference Fellowship Award, AAIC 2024** - awarded full conference registration and travel support.
- **ISMRM Trainee Stipend, 2022-2025** - awarded four consecutive years.

Professional Service & Leadership

- **Advisor**, Bangladeshi Student Association, Illinois Institute of Technology (2025-Present) - Mentor undergraduate and graduate students; support community engagement, professional development.
- **Organizer**, Hackathons & Robotics Workshops, MUNA (2024-Present) - lead annual STEM outreach events for 100+ high school students, promoting early interest in robotics, programming, and innovation.
- **Coordinator**, Engineering Club, Eastern University, Bangladesh (2018-2020) - Organized robotics/Arduino and coding workshops; led inter-department technical exhibitions; coordinated student teams, logistics, and judging; expanded year-round participation in extracurricular engineering activities.

Technical Skills

- **Programming & Machine Learning:** Python, R, MATLAB; scikit-learn, PyTorch, TensorFlow; XGBoost, Random Forest, SVM; SHAP; deep learning architectures (CNN, RNN, LSTM).
- **Neuroimaging Tools:** SPHARM-PDM; FSL, FreeSurfer, ANTs, SPM, ITK-SNAP.
- **Statistical Modeling:** Multivariate linear regression, mixed-effects (longitudinal trajectories; time interactions), permutation inference (PALM), mediation analysis, hypothesis-testing.
- **Reproducibility & Compute:** SLURM/HPC; Docker/Singularity; AWS/GCP/Azure; Git/GitHub, SQL.

Professional Memberships

- International Society for Magnetic Resonance in Medicine (ISMRM)**,** 2021 - Present
- Alzheimer's Association International Conference (AAIC), 2021 - Present
- Organization for Human Brain Mapping (OHBM)**,** 2021 - Present
- Radiological Society of North America (RSNA)**,** 2021 - Present

Peer Review & Editorial Service

- Reviewer, ISMRM Annual Meeting Abstracts (2025)

Certifications

- CITI Program (Human Subjects Research / IRB Training)
- Machine Learning Expert (AlgoExpert)

References

Konstantinos Arfanakis, PhD - Professor, Department of Biomedical Engineering; Director, Medical Imaging & Artificial Intelligence Research Center, Illinois Institute of Technology; Core Leader, Biomarker/Neuroimaging Core, Rush Alzheimer's Disease Center, Rush University Medical Center.
Email: arfanakis@illinoistech.edu, konstantinos_arfanakis@rush.edu

Julie A. Schneider, MD, MS - Professor of Pathology (Neuropathology) and Neurological Sciences; Associate Director and Neuropathology Core Leader, Rush Alzheimer's Disease Center, Rush University Medical Center (Chicago, IL, USA).
Email: Julie_A_Schneider@rush.edu

Alifiya Kapasi, PhD — Assistant Professor, Department of Pathology, Rush Medical College, Rush University; Research Neuropathologist, Rush Alzheimer's Disease Center, Rush University Medical Center (Chicago, IL, USA).
Email: Alifiya_Kapasi@rush.edu