

MUZAMMAL SHAFIQUE

Student Member, IEEE

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Homepage ◊ Google Scholar ◊ LinkedIn ◊ GitHub

EDUCATION

University of Michigan-Flint

January 2025 - April 2026

Masters of Science in Computer Science

- **CGPA:** 3.73/4.00 (93.25%)
- **Courses:** Deep Learning, Algorithm & Complexity Analysis, Natural Language Processing
- **Thesis:** “Towards Reliable Intracranial Aneurysm Analysis: Leveraging Foundation Models for Structure-Aware Detection and Segmentation across 3D CTA, ToF-MRA and DSA”

National University of Sciences and Technology (NUST)

September 2019 - May 2023

Bachelors of Science in Mathematics

- **CGPA:** 3.40/4.00 (85%)
- **Courses:** Calculus, Mathematical Computing, Probability Theory, Statistics, Linear Algebra
- **Final Year Project:** “Banach Fixed-Point Theorem in Proximity Spaces”

PUBLICATIONS

1. Muzammal S. et al. “**ARAN**: Leveraging Foundation Models for Vasculature-Tree-Informed **AR**tery-Aware Intracranial **AN**eurysm Detection in 3D CTA and ToF-MRA”, *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2026*, ‘**ACCEPTED**’
2. Muzammal S. et al. “**FocusSDF**: Boundary-Aware Learning for Medical Image Segmentation via Signed Distance Supervision”, *Proceedings of the 2026 IEEE 23rd International Symposium on Biomedical Imaging (ISBI), (London, UK)*, ‘**ACCEPTED**’
3. Nasir R., Muzammal S. et al. “**CrossStream-Seg**: A Cross-Guided Two-Stream Learning for Boundary-Sensitive ROI Segmentation”, *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2026*, ‘**ACCEPTED**’

POSTER PRESENTATIONS

1. Poster Presentation of “**FocusSDF**: Boundary-Aware Learning for Medical Image Segmentation via Signed Distance Supervision” in the 2026 *IEEE 23rd International Symposium on Biomedical Imaging (ISBI), (London, UK)*
2. Overall **third** position and \$1000 Award on “Multimodal Physics-Informed Graph Neural Networks for Intracranial Aneurysm Hemodynamics and Rupture Prediction”, at University of Michigan’s “AI in Reseach Symposium 2026”
3. Upcoming: Poster presentation at CVPR 2026 (June), with a fully sponsored travel award by the conference.

RESEARCH INTERESTS

3D Medical Image Analysis, Computer Vision, Vision Foundation Models, VLMs and LLMs in medical imaging, Multimodal Learning, Cerebrovascular and Cardiovascular Blood Hemodyanmics Prediction

EXPERIENCE

University of Michigan-Flint

January 2025 - Present

Graduate Research Assistant

- Currently working on:
 1. Artery-Aware Intracranial Aneurysm (IA) Segmentation and Rupture Prediction using VISTA3D foundation model: Achieved dice score of 0.9287 and 0.8415 on 6 class 3D cerebral arteries segmentation on ToF-MRA and CTA respectively
 2. Multimodal Physics-Informed Graph Neural Networks for Intracranial Aneurysm Hemodynamics and Rupture Prediction: Preliminary results show a mean absolute error (MAE) of 0.1721 m/s in velocity magnitude
- Worked on boundary-aware medical image segmentation of diverse imaging modalities including DSA, CTA, MRI and Ultrasound: Fine-tuned MedSAM
- Collaborated directly with a leading neurosurgeon at Henry, Dr. Ghaus Malik, at Henry Ford Hospital, gaining deep clinical insight into aneurysm morphology, rupture-critical biomarkers, cerebral artery branching patterns, and artery-specific velocity profiles and vessel diameters

NUSTIAN

August 2023 - December 2024

Data Analyst Consultant

- Built graph-based data analytics of organization's members based on their donation history: identified high-impact donors, improved targeted fundraising, forecasted \$150K+ in potential donations for 2024 donation-cycle with 88% model's accuracy

National University of Sciences and Technology (NUST)

June 2023 - July 2023

Research Assistant

- Built ML models, forecasted monthly fuel consumption for chemical plant chimneys, quantified prediction uncertainty using Bootstrapping and PCE, delivering 95% confidence intervals with more than 90% coverage to enable risk-aware energy planning and cost control

Oeson Learning

March 2023 - May 2023

Data Science Intern

- Built a movie recommendation engine through unsupervised learning using Streamlit. Learnt different tools and concepts of `ast.literal_eval`, PorterStemmer, text vectorization using bag of words technique, cosine similarity

National University of Sciences and Technology (NUST)

May 2021 - December 2021

External Relations Intern

- Collaborated with industry and academic stakeholders to build strategic partnerships, supporting university-industry engagement and contributing to successful fundraising initiatives for NUST

PROJECTS

Vision-Language Model Adaptation in Radiology

Fall 2025

Fine-tuned LLaMA-3.2-11B Vision-Instruct with LoRA on radiology image-report pairs to generate pathology-aware clinical narratives.

RAG-Based Medical Assistant for Brain Aneurysm

Summer 2025

Developed a retrieval-augmented generation (RAG) medical assistant grounding aneurysm-related queries in clinical evidence.

CURRENT COLLABORATIONS

1. Henry Ford Hospital, USA (Related to AI in Cerebrovascular Disorders)
2. Kuwait Foundation for the Advancement of Sciences, Kuwait (Related to AI in Cardiovascular Disorders)

TECHNICAL SKILLS & EXPERTISE

Scientific Computing	Python, R, C/C++, MATLAB, Data Processing, Model Evaluation
AI, Deep Learning, Vision	PyTorch, TensorFlow, nnUNet, MONAI
Foundation Models, GenAI	VISTA3D, MedSAM, Multimodal Llama, RAG, AI Assistants
HPC, & Research Tools	Large Scale GPU Computing, DDP, Slurm, Turbo Storage, Globus
Medical Imaging Modalities	DSA, CTA, MRA, Ultrasound, X-Ray, Axial, Coronal, Sagittal views, DICOM, NIFTI

CERTIFICATIONS

- Machine Learning Specialization - **Stanford University**
- Data Science - **Harvard University**
- Generative AI - **iNeuron**

AWARDS & HONORS

- Awarded a fully sponsored trip, including paper registration, to attend CVPR 2026 (June) to present my paper.
- University of Michigan Conference Travel Award of \$5000 to attend ISBI 2026 in London, UK
- Awarded \$1000 in “AI in Research Symposium 2026”, University of Michigan’s one of most prestigious award
- University of Michigan Non-Resident Graduate Scholarship
- Prime Minister’s Ehsaas Undergraduate Scholarship (fully funded award for complete BS degree)
- Dean’s Merit Scholarship Award (NUST)
- Offered Russian Government Scholarship 2023 for Masters in Artificial Intelligence