Meheraj **Hasan**

Machine Learning Researcher · AI Engineer

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Summary

A researcher focused on deep learning for medical image analysis, spanning classification, detection, and segmentation across ultrasound, fundus, histopathology, and dermoscopic imaging. Studying architectures that remain robust under real-world constraints — limited annotation, class imbalance, multi-vendor imaging hardware, and real-time inference requirements. Particularly interested in extending this work toward federated and privacy-preserving learning, enabling training on distributed clinical data without centralization. Currently an AI Engineering Intern at Samsung R&D Institute Bangladesh, developing real-time detection and segmentation models for ultrasound-based diagnostic pipelines under strict latency and FPS constraints. Also co-authoring research on a role-based crowdsourcing framework for Bengali lexicon development, in collaboration with researchers at the University of Trento and DataScientia, Italy. Previously a Research Intern at the Advanced Machine Intelligence Research Lab (AMIR Lab), advised by Prof. Dr. Muhammad Firoz Mridha, working on medical image analysis and applied deep learning.

Highlights

- Co-authored publications on medical image analysis spanning breast, retinal, brain, skin, and blood-smear imaging, accepted, under review or on going at international conferences and journals.
- Developing real-time detection and segmentation models for thyroid ultrasound diagnostics at Samsung R&D Institute Bangladesh, balancing clinical accuracy against FPS and latency constraints.
- Co-authoring a role-based crowdsourcing framework for Bengali lexicon development, compatible with the Universal Knowledge Core (UKC), in collaboration with the University of Trento and DataScientia, Italy.
- Recipient of the Honorable Dean's Award for five consecutive semesters, Faculty of Science and Technology, American International University–Bangladesh.

Field of Interest

My research interests include, but are not confined to:

- Deep learning for medical image classification, detection, and segmentation.
- Weakly-supervised and multiple instance learning under limited annotation.
- Self-supervised and attention-based representation learning for imaging.
- Federated and privacy-preserving learning for clinical data.
- Efficient, real-time model design for deployment-constrained clinical settings.
- Cross-device and cross-vendor generalization in medical imaging.
- Bioinformatics and computational biology applications of deep learning.
- Multimodal learning for clinical decision support.
- Digital pathology and computational histology.
- Multilingual NLP and lexical/knowledge resource construction.
- Emerging interest: LLMs and retrieval-augmented systems for clinical reasoning.

Education

American International University-Bangladesh (AIUB)

Dhaka-1229, Bangladesh

B.Sc. in Computer Science and Engineering

Sept. 2022 - Aug. 2026

- Major in Information Systems
- CGPA: 3.99/4.00

Work Experience

AI Solution Team, Medical Solution Group, Samsung R&D Institue Bangladesh Ltd. (SRBD)

Dhaka-1205, Bangladesh

Intern Engineer (AI)

March 2026 - Current

- Supervised by Muhammad Rakeeb, Assistant Principle Engineer, SRBD.
- Build and analyze medical AI project pipelines using ultrasound imaging.
- Proposed novel architectures in-terms of accuracy and efficiency.
- Write scalable and maintainable model training and integration scripts.
- Developed project specific annotation and evaluation tools.

Advanced Machine Intelligence Research Lab (AMIR Lab)

Dhaka, Bangladesh

Research Intern

Jan. 2026 - May 2026

- Advised by Prof. Dr. Muhammad Firoz Mridha.
- Conducted research on advanced machine intelligence and deep learning methodologies.
- Worked on computer vision and large language model architectures for real-world research problems.
- Collaborated with researchers on experimental design, model evaluation, and result analysis.

Research Projects

AI-Assisted Diagnostic System for Medical Ultrasound Imaging

Medical Solution Group, SRBD

Affiliated with Samsung R&D Institute Bangladesh Ltd. (SRBD) *March 2026 - Present*

- Built and cleaned segmentation and detection datasets from multi-vendor ultrasound machine images
- Studied, fine-tuned, and added novelty to detection models to meet real-time FPS and performance benchmarks
- Developed segmentation models with novel improvements to meet clinical accuracy requirements on freeze-frame ultrasound images
- Contributed to an automated structured reporting pipeline (TI-RADS style) generated from segmentation outputs
- Keywords: Medical Image Segmentation, Object Detection, Model Optimization, Real-time Inference, Deep Learning

Expert-in-the-Loop Medical Image Annotation Tool

Medical Solution Group, SRBD

Affiliated with Samsung R&D Institute Bangladesh Ltd. (SRBD) *October 2026 - November 2026*

- Developed a desktop tool for clinical experts to annotate medical images and video frames for project-specific datasets
- Implemented OpenCV-based bounding-box propagation across sequential frames with confidence scores, where a correction on any frame auto-updates the rest
- Built a grid view comparing original images, expert annotations, and predictions from user-selected local ONNX models
- Designed a role-based review workflow:
  - Annotators can approve or delete auto-generated boxes one at a time or in batches
  - Doctors can approve, reject, or correct annotators' labels
  - Full undo/redo history is supported
- Added image enhancement controls (brightness, contrast, hue, saturation, CLAHE, and single RGB channel view) to improve nodule visibility
- Keywords: Python, PyQt5, OpenCV, ONNX Runtime, NumPy, lxml, Object Tracking, Human-in-the-Loop Annotation, Medical Imaging

Drinking Water Safety Prediction using Machine Learning

End-to-End ML System Development

Personal Project *Sep. 2025 - Nov. 2025*

- Developed an end-to-end machine learning system to predict drinking water safety using physicochemical features
- Deployed the trained model as a public web app using Gradio and Hugging Face Spaces
- Keywords: Python, Pandas, NumPy, Scikit-learn, Gradio, Hugging Face

Publications

International Journal

1. **Meheraj Hasan**, Fariha Alam Urbana, Mahamodul Hasan Mahadi, Firoz Ahmed, Md. Shabiul Islam, Sadia Sharmin, "PoxCSAF-Net: Cross-Scale Attention Fusion for Privacy-Aware Federated Classification of Mpox and Visually Similar Skin Lesions," in *Frontiers in Digital Health*, 2026. (Submitted)
2. **Meheraj Hasan**, Sultanul Arifeen Hamim, Muhammad Firoz Mridha, "RetiCut-Net: Source-Specific Ordinal Cut-Points for Multi-Site Diabetic Retinopathy Grading," 2026. (On going)
3. Saiful Islam Oni, MD Sazzad Khan, **Meheraj Hasan**, Shams Pahlowan Soad, Khandaker Tabin Hasan, Hadi Mahmoud Yousef Khalilia, Fusto Guinchiglia, "Ben-LKC: A Language-Independent Role-Based Crowdsourcing Framework for UKC-Compatible Bengali Lexicon Development," 2026. (On going)

International Conference

1. **Meheraj Hasan**, Nazifa Tabushum Turaba, Ainea Esrat Esika, Sanjid Raaz, Sultanul Arifeen Hamim, Muhammad Firoz Mridha, "HemaVision-Net: A YOLOv11-Based Framework for Severely Occluded Blood Smears," in *International Conference on Data Analytics for Business and Industry (ICDABI)*, 2026. Accepted. To appear.
2. Sumshun Nahar Eity, **Meheraj Hasan**, Hasan Mahmud, S. M. Mehedi Hasan, Tanisha Fairooz, Kazi Fattah Afnan, Rifath Mahmud, "A Comparative Performance Analysis of State-of-the-Art Deep Learning Architectures for Malting Barley Disease Classification," in *International Conference on Electrical and Computer Engineering (ICECE)*, 2026. (Submitted)
3. **Meheraj Hasan**, Taharat Muhammad Jabir, Md. Rehab Ansary Yasin, Mohammed Samir, Sharfuddin Mahmood, "DINO-MIL: An ROI-Based Feature Embedding Framework for Multiple Instance Learning in Breast Mass Classification," in *International Conference on Quantum Photonics, Artificial Intelligence & Networking (QPAIN)*, 2026, pp. 1–6. **Link:** ieeexplore.ieee.org/
4. Saiful Islam Oni, **Meheraj Hasan**, Arpon Paul Amit, Shahnaj Parvin, Farzana Bente Alam, Kamruddin Nur, "Detection and Classification of Diabetic Retinopathy Using EfficientNetB0: A Lightweight Model with Transfer Learning Approach," in *International Conference on Innovation and Intelligence for Informatics, Computing, and Technologies (3ICT)*, 2026, pp. 1–6. **Link:** ieeexplore.ieee.org/

Honors & Awards

Academic Awards

Fall 2026	**Honorable Dean's Award,** FST, AIUB	*Dhaka-1229, Bangladesh*
Spr. 2025	**Honorable Dean's Award,** FST, AIUB	*Dhaka-1229, Bangladesh*
Fall 2025	**Honorable Dean's Award,** FST, AIUB	*Dhaka-1229, Bangladesh*
Spr. 2024	**Honorable Dean's Award,** FST, AIUB	*Dhaka-1229, Bangladesh*
Fall 2024	**Honorable Dean's Award,** FST, AIUB	*Dhaka-1229, Bangladesh*
2022	**Merit Based Scholarship,** FST, AIUB	*Dhaka-1229, Bangladesh*

Other Awards

2025	**Runner-up,** AI-Reinventing Campus Connect Workshop	*Dhaka-1229, Bangladesh*

Certificates

- 2025 **Artificial Intelligence & Machine Learning Fundamentals,** Grameenphone Academy
- 2025 **Neural Networks and Deep Learning,** Coursera | DeepLearning.AI
- 2025 **NumPy for Data Science – Real-Time Coding Exercises,** Udemy
- 2025 **Supervised Machine Learning: Regression and Classification,** Coursera | DeepLearning.AI
- 2025 **Quality Assurance and Software Testing,** Enhanced Digital Government & Economy Project

Skills

Programming Languages	Python, C#
Machine Learning Frameworks	PyTorch, TensorFlow/Keras, Scikit-learn, NumPy, Pandas
Other Tools	Git, LaTeX

References

Prof. Dr. Muhammad Firoz Mridha — *American International University-Bangladesh*

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- Mobile: +8801674791594

Prof. Dr. Khandaker Tabin Hasan — *American International University-Bangladesh*

Professor & Associate Dean, Faculty of Science & Technology – Research Advisor
- Email: tabin@aiub.edu

Muhammad Rakeeb — *Samsung R&D Institute Bangladesh Ltd.*

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