

Jamal Hossain

PhD Applicant | AI/ML Researcher

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Research Interests

My research interests span Healthcare AI, Computer Vision, Cybersecurity, Federated Learning, and Explainable AI, with a focus on: (a) machine learning for student mental health analysis and severity stratification; (b) medical image analysis for disease detection, clinical interpretation, and severity assessment; and (c) interactive 3D decision space visualization for misclassification analysis in machine learning driven network intrusion detection systems.

Education

University of Rajshahi

Rajshahi, Bangladesh

B.Sc. in Computer Science and Engineering (CGPA: 3.50/4.00)

Jan 2020 – Nov 2025

Completed the academic requirements at Imperial College of Engineering, Khulna, with the degree conferred by the University of Rajshahi.

Research Summary

Published papers: 1 | Manuscripts under review: 3 | Citations: 10 | Peer Review: 2

Publications

- Protecting Student Mental Health with a Context-Aware Machine Learning Framework for Stress Monitoring**
Md Sultanul Islam Ovi, **Jamal Hossain**, Md Raihan Alam Rahi, Fatema Akter
2026 IEEE 2nd International Conference on Quantum Photonics, Artificial Intelligence & Networking (QPAIN)
- An Interactive 3D Decision Space Visualization Framework for Misclassification Analysis in Machine Learning Driven Network Intrusion Detection Systems (Under Review)**
Jamal Hossain, Mazharul Islam, Krishna Debnath
- Psychometric Validation and Explainable Reduced Item Depression Severity Stratification in Bangladeshi University Students (Under Review)**
Md Sultanul Islam Ovi, **Jamal Hossain**, Md Raihan Alam Rahi
- Lesion Aware Explainable Federated Deep Learning for Privacy Preserving Multicenter Diabetic Retinopathy Detection and Severity Grading from Retinal Fundus Images (Under Review)**
Md Abdullah Asrafee, **Jamal Hossain**, Ummeh Aisha

Research Experience

Research Den

Fairfax, VA, USA, Remote

Lead Researcher, Advisor: Md. Sultanul Islam Ovi

Dec 2024 to Present

Selected research projects:

- Protecting Student Mental Health with a Context Aware Machine Learning Framework for Stress Monitoring.**
- Psychometric Validation and Explainable Reduced Item Depression Severity Stratification in Bangladeshi University Students.**

Focused on healthcare AI, machine learning, student mental health analytics, and explainable AI.

An Interactive 3D Decision Space Visualization Framework for Misclassification Analysis in Machine Learning Driven Network Intrusion Detection Systems

Focused on NIDS, 3D decision space visualization, misclassification analysis, and cybersecurity.
Thesis completed in fulfillment of the B.Sc. requirements of the University of Rajshahi.

Teaching Experience

English Version Special Care <i>Senior Instructor</i>	Khulna, Bangladesh Dec 2021 – Jul 2025
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- Taught Mathematics and ICT at the Higher Secondary level, equivalent to Grades 11 and 12.

Ideal Cadet Academy <i>Senior Instructor</i>	Khulna, Bangladesh Jul 2022 – Jul 2025
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- Taught Mathematics for Cadet College admission preparation, with emphasis on problem solving and examination practice.

Technical Skills

- **Programming Languages:** Python, Java, C#, C/C++, SQL, and Bash.
- **Machine Learning & Deep Learning:** PyTorch, TensorFlow, Keras, Hugging Face Transformers, Scikit-learn
- **Computer Vision and Medical Imaging:** OpenCV, object detection, segmentation, medical image analysis
- **Generative AI and Retrieval Systems:** LangChain, RAG, agentic AI, prompt and context engineering
- **Model Optimization:** Quantization, pruning, model compression
- **Data Science & Analytics:** Pandas, NumPy, Matplotlib, Seaborn, Tableau, Power BI
- **Tools & Platforms:** AWS, Linux, Docker, Kubernetes, Git
- **Parallel and Distributed Computing:** MPI, CUDA

Technical Projects

Bengali Handwritten Prescription Digitizer 🔄	<i>Computer Vision, OCR, Medical Text Recognition</i>
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- Developed an OCR based system to extract medicine names, dosage, frequency, and instructions from Bangladeshi handwritten prescription images.
- Addressed unclear handwriting, mixed Bangla and English medical terms, poor image quality, and irregular prescription layouts.
- Designed a structured output workflow for image upload, text recognition, manual verification, and medicine information extraction.

Counterfeit Currency Detection Under Real Phone Camera Conditions 🔄	<i>Computer Vision, OpenCV</i>
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- Built a vision model to identify suspected counterfeit currency from phone camera images captured under blur, low light, angle variation, clutter, and partial visibility.
- Evaluated model robustness under realistic capture conditions instead of relying only on clean scanned currency images.
- Developed a practical detection workflow using image preprocessing, visual feature analysis, model inference, and structured prediction output.

Academic Services

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| • <i>Reviewer</i> , NGEN-AI, Italy (Conference) | 2026 |
| • <i>Reviewer</i> , QUANCOM, Italy (Conference) | 2026 |

Volunteer & Outreach

AIML Professional Community Bangladesh 	Bangladesh, Remote
<i>Community Member</i>	Mar. 2025 – Present
• Participated in AI and machine learning discussions, technical knowledge sharing, and professional community engagement.	
OSTAD 	Khulna, Bangladesh
<i>Campus Ambassador, Imperial College of Engineering</i>	Jun 2023 – Jul 2024
• Supported student outreach, course awareness, and technology learning engagement.	

Extracurricular Activities

• <i>Executive Committee Member</i>, Imperial Computing Access Nation at ICE	2022 – 2025
• <i>Organizing Committee Member</i>, 5th and 6th Divisional CSE Fest at ICE	2023 – 2024
• <i>11th Place</i>, 13th National Mathematics Olympiad at KUET	2023
• <i>98th Place</i>, Team Mind Optimizers, ICPC Programming Contest Bangladesh Region at BUBT	2022
• <i>2nd Place</i>, Inter University Programming Contest at ICE	2022

Presentations & Talks

Protecting Student Mental Health with a Context Aware Machine Learning Framework for Stress Monitoring 	16 to 18 April 2026
<i>Poster presentation, 2026 IEEE 2nd International Conference on Quantum Photonics, Artificial Intelligence and Networking (QPAIN)</i>	