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Mohaimenul Azam Khan Raiaan

Research Interests

Artificial Life, Computer Vision, Explainable Artificial Intelligence, and Large Language Models.

Education

2025–Present Doctor of Philosophy in Data Science and Artificial Intelligence
Monash University, Clayton, Australia
Concentration: Computer Vision and Machine Learning

2019–2023 Bachelor of Science in Computer Science and Engineering
United International University, Dhaka, Bangladesh
Specialization: Data Science (Major CGPA: 3.92/4.00)

Career History

2023 – 2025 Consultant - Research Assistant
Faculty of Science and Technology
Charles Darwin University, Australia

2022–2023 Research Assistant
Department of Computer Science and Engineering
United International University, Dhaka, Bangladesh

2022–2023 Undergraduate Teaching Assistant
Department of Computer Science and Engineering
United International University
Courses: Final Year Design Project (FYDP), Artificial Intelligence Laboratory

Honors and Awards

2025 Recipient of Monash Graduate Scholarship (MGS)

2025 Recipient of Monash International Tuition Scholarship (MITS)

2019-2023 Merit-based scholarship for 12 consecutive trimesters.

2022 Champion: System Analysis and Design Laboratory, CSE Project Show, Spring 2022 *(Team Leader)*

2022 Finalist: Hult Prize, United International University *(Team Leader)*

2021 2nd Runner-Up: Database Management System Laboratory, CSE Project Show, Fall 2021 *(Team Leader)*.

2021 Runners-up: League of Emerging Stars National Debate Competition *(Team Leader)*

2019 Champion: 10th UIU Intra Debate Championship (English) *(Team Leader)*

2019 Champion: 10th UIU Intra Debate Championship (Bangla) *(Team Leader)*

Publications

(*denotes equal contribution)

Peer-Reviewed Journal Publications

[1] **Raiaan, M. A. K.**, Fahad, N. M., Mukta, M. S. H., & Shatabda, S. (2024). *Mammo-Light: A lightweight convolutional neural network for diagnosing breast cancer from mammography images.* Biomedical Signal Processing and Control. https://doi.org/10.1016/j.bspc.2024.106279

[2] Abian, A. I.*, **Raiaan, M. A. K.***, Jonkman, M., Islam, S. M. S., & Azam, S. (2025). *Atrous spatial pyramid pooling with Swin Transformer model for classification of gastrointestinal tract diseases from videos with enhanced explainability.* Engineering Applications of Artificial Intelligence. https://doi.org/10.1016/j.engappai.2025.110656

[3] **Raiaan, M. A. K.**, Fatema, K., Khan, I. U., Azam, S., Rashid, M. R. U. R., Mukta, M. S. H., Jonkman, M., & Boer, F. D. (2023). *A lightweight robust deep learning model gained high accuracy in classifying a wide range of diabetic retinopathy images.* IEEE Access. https://doi.org/10.1109/ACCESS.2023.3272228

[4] **Raiaan, M. A. K.**, Fahad, N. M., Chowdhury, S., Sutradhar, D., Mihad, S. S., & Islam, M. M. (2023). *"IoT-based object-detection system to safeguard endangered animals and bolster agricultural farm security"* Future Internet, **15**(12), 372. https://doi.org/10.3390/fi15120372

[5] **Raiaan, M. A. K.**, Mukta, M. S. H., Fatema, K., Fahad, N. M., Sakib, S., Mim, M. M. J., Ahmed, J., Ali, M. E., & Azam, S. (2024). *A review on large language models: Architectures, applications, taxonomies, open issues, and challenges.* IEEE Access. https://doi.org/10.1109/ACCESS.2024.3365742

[6] **Raiaan, M. A. K.**, Sakib, S., Fahad, N. M., Al Mamun, A., Rahman, M. A., Shatabda, S., & Mukta, M. S. H. (2024). *A systematic review of hyperparameter optimization techniques in Convolutional Neural Networks.* Decision Analytics Journal. https://doi.org/10.1016/j.dajour.2024.100470

[7] Abian, A. I., **Raiaan, M. A. K.**, Karim, A. M. A., Azam, S., Fahad, N. M., Shafiabady, N., Yeo, K. C., & De Boer, F. (2024). *Automated diagnosis of respiratory diseases from lung ultrasound videos ensuring XAI: an innovative hybrid model approach.* Frontiers in Computer Science. https://doi.org/10.3389/fcomp.2024.1438126

[8] Khan, I. U., **Raiaan, M. A. K.**, Fatema, K., Azam, S., Rashid, M. R. U. R., Mukta, M. S. H., Jonkman, M., & Boer, F. D. (2023). *A computer-aided diagnostic system to identify diabetic retinopathy, utilizing a modified compact convolutional transformer and low-resolution images to reduce computation time.* Biomedicines. https://doi.org/10.3390/biomedicines11061566

[9] Fahad, N. M., **Raiaan, M. A. K.**, Abian, A. I., Debnath, R. K., Montaha, S., Jonkman, M., & Azam, S. (2025). *Advanced biomedical imaging for identifying blood cell type: Integrating segmentation, feature extraction, and GraphSage model.* Biomedical Engineering Advances. https://doi.org/10.1016/j.bea.2025.100174

[10] Azam, S., Montaha, S., **Raiaan, M. A. K.**, Rafid, A. K. M. R. H., Mukta, M. S. H., & Jonkman, M. (2023). *An automated decision support system to analyze malignancy patterns of breast masses employing medically relevant features of ultrasound images.* Journal of Imaging Informatics in Medicine. https://doi.org/10.1007/s10278-023-00925-7

[11] Rahman, M. A., Fahad, N. M., **Raiaan, M. A. K.**, Jonkman, M., De Boer, F., & Azam, S. (2025). *Advancing skin cancer detection integrating a novel unsupervised classification and enhanced imaging techniques.* CAAI Transactions on Intelligence Technology. https://doi.org/10.1049/cit2.12410

[12] Sutradhar, D., Fahad, N. M., **Raiaan, M. A. K.**, Jonkman, M., & Azam, S. (2025). *Cervical spine fracture detection utilizing YOLOv8 and deep attention-based vertebrae classification ensuring XAI.* Biomedical Signal Processing and Control. https://doi.org/10.1016/j.bspc.2024.107228

[13] Azam, S., Rony, M. A. H., **Raiaan, M. A. K.**, Fatema, K., Karim, A., Jonkman, M., Beissbarth, J., Leach, A., & De Boer, F. (2024). *Reimagining otitis media diagnosis: A fusion of nested U-Net segmentation with graph theory-inspired feature set.* Array. https://doi.org/10.1016/j.array.2024.100362

[14] Mukta, M. S. H., Ahmed, J., **Raiaan, M. A. K.**, Fahad, N. M., Islam, M. N., Imtiaz, N., Islam, M. A., Ali, M. E., & Azam, S. (2024). *Behavior based group recommendation from the social media dataset by using deep learning and topic modeling.* SN Computer Science. https://doi.org/10.1007/s42979-024-03055-1

[15] Rony, M. A. H., Fatema, K., **Raiaan, M. A. K.**, Hassan, M. M., Azam, S., Karim, A., Jonkman, M., Beissbarth, J., De Boer, F., Islam, S. M. S., & Leach, A. (2024). *Artificial intelligence-driven advancements in otitis media diagnosis: a systematic review.* IEEE Access. https://doi.org/10.1109/ACCESS.2024.3428700

[16] Mukta, M. S. H., Ahmad, J., **Raiaan, M. A. K.**, Islam, S., Azam, S., Ali, M. E., & Jonkman, M. (2023). *An investigation of the effectiveness of deepfake models and tools.* Journal of Sensor and Actuator Networks. https://doi.org/10.3390/jsan12040061

Under Review

[1] **Raiaan, M. A. K.***, Rahman, M. A.*, Azam, S., Yeo, K. C., Sebastian, Y., & Jonkman, M. (2025). *Diffusion-based knowledge distillation for effective multi-organ segmentation with reduced computational time.* Computers in Biology and Medicine. Manuscript ID: CIBM-D-25-07541

[2] **Raiaan, M. A. K.***, Rahman, M. A.*, Shermin, T., Islam, M. R., Hussain, M., & Azam, S. (2025). *A fine-grained attention and geometric correspondence model for musculoskeletal risk classification in athletes using multimodal visual and skeletal features.* Engineering Applications of Artificial Intelligence (Manuscript ID: EAAI-25-11710).

[3] **Raiaan, M. A. K.**, Mukta, M. S. H., Islam, N., & Fahad, N. M. (2024). *Unlocking suicidal ideation: A facial marker-assisted, explainable AI and graph convolution network-based framework.* Neurocomputing. Manuscript ID: NEUCOM-D-24-03164

[4] Fatema, K.*, **Raiaan, M. A. K.***, Azam, S., Mukta, M. S. H., Rashid, M. R., Jonkman, M (2025). *Automated Diabetics Retinopathy Grade Analysis Based on the Extracted Features from Segmented Medical Markers.* Discover Computing (Manuscript ID: 3daaa31b-f0f2-40e5-8f7d-954318cc4710).

[5] Rahman, M. A., **Raiaan, M. A. K.**, Azam, S., Karim, A., Beissbarth, J., & Leach, A. (2025). *WeCKD: A weakly-supervised chain-based knowledge distillation framework for multimodal image classification.* IEEE Transactions on Image Processing (Manuscript ID: TIP-35208-2025).

[6] Rahman, M. A., **Raiaan, M. A. K.**, Abian, A. I., Zhang, Y., Jonkman, M., & Azam, S. (2025). *ReFRM3D: A radiomics-enhanced fused residual multiparametric 3D network with multi-scale feature fusion for glioma characterization.* Knowledge-Based Systems (Manuscript ID: KNOSYS-D-25-03102).

[7] Debnath, R. K., **Raiaan, M. A. K.**, Rahman, M. A., Selvarajah, T., Yeo, K. C., & Azam, S. (2025) *SSMT-ConED: A semi-supervised student–teacher framework with contrastive learning and generative adversarial network-based augmentation for robust multi-organ segmentation across CT and MRI modalities.* Biomedical Signal Processing and Control (Manuscript ID: BSPC-D-25-06356).

[8] Fahad, N. M., **Raiaan, M. A. K.**, Azam, S.*, Mukta, M. S. H., Azid, S. I., Campbell, H. A. (2024) *MO-SA: An Optimized Multi Objective Simulated Annealing Approach for Efficient Drone-Based Products Delivery.* Journal of Scheduling (Manuscript ID: JOSH-D-24-00080R1).

[9] Sutradhar, D.*, Rahman, M. A.*, **Raiaan, M. A. K.**, Mohamed, R. E., Azam, S. (2025) *A Source-Free Approach for Domain Adaptation via Multiview Image Transformation and Latent Space Consistency.* IEEE Transactions on Image Processing (Manuscript ID: TIP-34966-2025).

[10] Ahmed, J., Rahman, M. A., **Raiaan, M. A. K.**, Azam, S. (2025) *Predicting Post-Resection Colorectal Liver Metastases Recurrence using Advanced Graph Neural Networks with Explainability and Causal Inference.* Advanced Intelligent Systems (Manuscript ID: aisy.202500596).

[11] Abian, A. I.*, Debnath, R. K.*, Rahman, M. A., **Raiaan, M. A. K.**, Islam, M. R., Karim, A., Mohamed, R. E., Azam, S. (2025) *HANS-Net: Hyperbolic Convolution and Adaptive Temporal Attention for Accurate and Generalizable Liver and Tumor Segmentation in CT Imaging.* IEEE Transactions on Medical Imaging (Manuscript ID: TRPMS-2025-0266). Preprint available: https://doi.org/10.48550/arXiv.2507.11325.

[12] Sutradhar, D., Debnath, R. K., **Raiaan, M. A. K.**, Zhang, Y., Mohamed, R. E., Azam, S. (2025) *PPORLD-EDNetLDCT: A Proximal Policy Optimization-Based Reinforcement Learning Framework for Adaptive Low-Dose CT Denoising.* Computers in Medical Imaging and Graphics (Manuscript ID: CMIG-D-25-02619). Preprint available: https://arxiv.org/abs/2509.03185.

[13] Chowa, S. S., Alvi, R., Rahman, S. S., Rahman, M. A., **Raiaan, M. A. K.**, Islam, M. R., Hussain, M., Azam, S. (2025) *From Language to Action: A Review of Large Language Models as Autonomous Agents and Tool Users.* Artificial Intelligence Review (Manuscript ID: e5d7ea95-915d-43aa-81c6-3ceb6b25d5b0). *Preprint available:* https://doi.org/10.48550/arXiv.2508.17281.

[14] Rahman, S. S., Islam, M. A., Alam, M. M., Zeba, M., Rahman, M. A., Chowa, S. S., **Raiaan, M. A. K.**, Azam, S. (2025) *Hallucination to Truth: A Review of Fact-Checking and Factuality Evaluation in Large Language Models.* Artificial Intelligence Review (Manuscript ID: 50a23270-f0ea-490a-8069-81cd72698607). Preprint available: https://doi.org/10.48550/arXiv.2508.03860.

Supervision

I am a strong promoter of outreach and highly active in supervising young researchers (around 30). Some of my notable mentees include:

- Nur Mohammad Fahad (Sep 2022 – Present)
- Arefin Ittesafun Abian (Aug 2023 – Present)
- Sadia Sultana Chowa (Nov 2024 – Present)
- Md Abdur Rahman (Aug 2023 – Present)

- Debopom Sutradhar (Aug 2023 – Present)
- Ripon Kumar Debnath (Nov 2023 – Present)
- Sayeem Been Zaman (Nov 2023 – Present)
- Wasimul Karim (Nov 2023 – Present)
- Md. Adnanul Islam (Feb 2024 – Present)
- Subhey Sadi Rahman (Feb 2024 – Present)
- Md. Mahbub Alam (Feb 2024 – Present)
- Riasad Alvi (Feb 2025 – Present)
- Abdullah Al Mamun (Jan 2025 – Present)
- Musarrat Zeba (Jan 2025 – Present)
- Ariful Haque Shahed (Dec 2024 – Present)
- Kishoar Jahan Tithee (Jan 2025 – Present)
- Md. Delwar Shahadat Deepu (Feb 2025 – Present)
- Eashrat Jahan (Aug 2024 – Present)
- Shahil Yasar Haque (Aug 2024 – Present)

Workshops and Talks

2025 **A Beginner's Guide to Machine Learning** – Invited by DPI CPC, Daffodil Polytechnic Computer and Programming Club

Academic Services

Reviewer

[1] Computers in Biology and Medicine
[2] Scientific Reports
[3] Artificial Intelligence Review
[4] Neurocomputing
[5] PLOS One
[6] Array
[7] Journal of Supercomputing
[8] Biomedical Signal Processing and Control