Md Saikat Islam Khan

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RESEARCH INTERESTS AND CONTRIBUTIONS

Research Summary: I am a PhD student in the **BRAINS Lab** at Rensselaer Polytechnic Institute. My PhD focus is on federated learning with differential privacy. My research interests also include exploring the underlying mechanisms of federated learning, particularly in enhancing its explainability to ensure models are transparent and interpretable.

Impact & Recognition: I have published **seven** first-authored papers (**26+** total, including co-authored works) in venues such as CIFEr, DAPPS, JKSUCIS, CSBJ, AIMS PH, and ETT. My work has been recognized with one **Best Paper** Award at TCCE. These contributions have garnered significant recognition, with over **1000** citations and an H-index of **15**, reflecting the impact of my research in federated learning, health informatics, and deep learning.

Keywords: Federated Learning, Differential Privacy, Federated Explainability, Federated Large Language Models.

ACADEMIC CREDENTIALS

Rensselaer Polytechnic Institute — Troy, New York, USA
PhD Student in Computer Science — *August 2023 - May 2028*
CGPA: *4.00 on the scale of 4.00*
Advisor: Dr. Oshani Seneviratne
Co-Advisor: Dr. Stacy Patterson

Mawlana Bhashani Science and Technology University — Tangail, Bangladesh
B.Sc in Computer Science and Engineering — *2015 - 2019*
CGPA: *3.80 on the scale of 4.00.*
Position: 3^{rd}

PEER-REVIEWED PUBLICATIONS

Conference Papers

Khan MS, Gupta A, Seneviratne O, Patterson S. Fed-RD: Privacy-Preserving Federated Learning for Financial Crime Detection. *arXiv preprint.* 2024 Aug 3. [Accepted at CIFEr](**Link**)

Tran L, Chari S, **Khan MS**, Zachariah A, Patterson S, Seneviratne O. A differentially private blockchain-based approach for vertical federated learning. *IEEE International Conference on Decentralized Applications and Infrastructures (DAPPS).* 2024 Jul 15 (pp. 86-92), IEEE.(**Link**)

Hasan M, Rahman A, Karim M, **Khan MS**, Islam S, Islam M. Normalized approach to find optimal number of topics in Latent Dirichlet Allocation (LDA). *In Proceedings of International Conference on Trends in Computational and Cognitive Engineering.* 2021 (pp. 341-354). Springer, Singapore. [Won the **best paper** award] (**Link**)

Islam N, Shamim SM, Fazla Rabbi M, **Khan MS**, Abu Yousuf M. Building Machine Learning Based Firewall on Spanning Tree Protocol over Software Defined Networking. *In Proceedings of International Conference on Trends in Computational and Cognitive Engineering.* 2021 (pp. 557-568). Springer, Singapore. (**Link**)

Rahman A, Islam MJ, **Khan MS**, Kabir S, Pritom AI, Karim MR. Block-sdotcloud: Enhancing security of cloud storage through blockchain-based sdn in iot network. *2nd International Conference on Sustainable Technologies for Industry 4.0 (STI).* 2020 Dec 19 (pp. 1-6). IEEE. (**Link**)

Islam N, **Khan MS**, Hasan MN, Yousuf MA. Computing Confinement Loss of Open-Channels Based PCF-SPR Sensor with ANN Approach. *IEEE International Conference on Telecommunications and Photonics (ICTP)*. 2023 Dec 21 (pp. 01-05). IEEE. (**Link**)

Uddin KM, Borhan R, Rahman EU, Sharmin F, **Khan SI**. Dangerous Landslide Suspectable Region Forecasting in Bangladesh–A Machine Learning Fusion Approach. *International Conference on Artificial Intelligence and Logistics Engineering*. 2023 Mar 11 (pp. 299-309). Cham: Springer Nature Switzerland. (**Link**)

Journal Articles

Khan MS, Rahman A, Debnath T, Karim MR, Nasir MK, Band SS, Mosavi A, Dehzangi I. Accurate Brain Tumor Detection Using Deep Convolutional Neural Network. *Computational and Structural Biotechnology Journal*. 2022 Aug 27. [Rank: **Q1**, Impact Factor: **4.4**] (**Link**)

Khan MS, Shahrior A, Karim R, Hasan M, Rahman A. MultiNet: A deep neural network approach for detecting breast cancer through multi-scale feature fusion. *Journal of King Saud University-Computer and Information Sciences*. 2021 Aug 17. [Rank: **Q1**, Impact Factor: **5.2**] (**Link**)

Khan MS, Islam N, Uddin J, Islam S, Nasir MK. Water quality prediction and classification based on principal component regression and gradient boosting classifier approach. *Journal of King Saud University-Computer and Information Sciences*. 2021 Jun 14. [Rank: **Q1**, Impact Factor: **5.2**] (**Link**)

Khan MS, Rahman A, Karim MR, Bithi NI, Band SS, Dehzangi A, Alinejad-Rokny H. Covidmulti-net: a parallel-dilated multi scale feature fusion architecture for the identification of covid-19 cases from chest x-ray images. *Human Centric Computing and Information Sciences*.[Rank: **Q1**, Impact Factor: **3.9**] (Status: Accepted) (Preprint Version: **Link**)

Khan MS, Rahman A, Islam S, Nasir MK, Band SS, Mosavi A. IoT and Wireless Sensor Networking-based Effluent Treatment Plant Monitoring System. *Acta Polytechnica Hungarica*. 2021 Jan 1;18(10):205-24. [Rank: **Q2**, Impact Factor: **1.8**] (**Link**)

Rahman A, Hossain M, Muhammad G, Kundu D, Debnath T, Rahman M, **Khan MS**, Islam S, Tiwari P, Band SS. Federated learning-based AI approaches in smart healthcare: concepts, taxonomies, challenges, and open issues. *Cluster Computing*. 2022 Aug 17:1-41. [Rank: **Q1**, Impact Factor: **3.6**] (**Link**)

Nur A, **Khan MS**, Nasir MK. Using Fused Contourlet Transform and Neural Features to Spot COVID19 Infections in CT Scan Images. *Intelligent Systems with Applications*. 2023 Jan 13:200182. [Rank: **Q1**] (**Link**)

Rahman A, Debnath T, Kundu D, **Khan MS**, Aishi AA, Sazzad S, Sayduzzaman M, Band SS. Machine learning and deep learning-based approach in smart healthcare: Recent advances, applications, challenges and opportunities. *AIMS Public Health*. 2024; 11(1):58. [Rank: **Q2**, Impact Factor: **2.2**] (**Link**)

Rahman A, **Khan MS**, Montieri A, Islam MJ, Karim MR, Hasan M, Kundu D, Nasir MK, Pescapè A. BlockSD-5GNet: Enhancing security of 5G network through blockchain-SDN with ML-based bandwidth prediction. *Transactions on Emerging Telecommunications Technologies*. 2024 Apr;35(4):e4965. [Rank: **Q1**, Impact Factor: **2.6**] (**Link**)

Rahman MM, Nasir MK, Nur-A-Alam M, **Khan MS**. Proposing a hybrid technique of feature fusion and convolutional neural network for melanoma skin cancer detection. *Journal of Pathology Informatics*.2023 Jan 1;14:100341.[Rank: **Q2**, Impact Factor: **4.3**] (**Link**)

Mazumder B, **Khan MS**, Uddin KM. Biorthogonal wavelet based entropy feature extraction for identification of maize leaf diseases. *Journal of Agriculture and Food Research.* 2023 Dec 1;14:100756. [Rank: **Q1**, Impact Factor: **4.8**] (**Link**)

Rahman MM, **Khan MS**, Babu HM. BreastMultiNet: A multi-scale feature fusion method using deep neural network to detect breast cancer. *Array.* 2022 Nov 7:100256. [Rank: **Q1**, Impact Factor: **2.3**] (**Link**)

Shaha P, **Khan MS**, Rahman A, Hossain MM, Mammun GM, Nasir MK. A Prevalent Model-based on Machine Learning for Identifying DRDoS Attacks through Features Optimization Technique. *Statistics, Optimization & Information Computing.* 2024 Aug 25. [Rank: **Q3**, Impact Factor: **1.3**] (**Link**)

Uddin KM, Nahid MN, Ullah MM, Mazumder B, **Khan MS**, Dey SK. Machine Learning-Based Chronic Kidney Cancer Prediction Application: A Predictive Analytics Approach. *Biomedical Materials & Devices.* 2024 Sep; 2(2):1028-48. [Impact Factor: **3.3**] (**Link**)

Rahman MM, Basar MA, Shinti TS, **Khan MS**, Babu HM, Uddin KM. A deep CNN approach to detect and classify local fruits through a web interface. *Smart Agricultural Technology.* 2023 Oct 1;5:100321. [Rank: **Q1**, Impact Factor: **6.3**] (**Link**)

Rahaman MA, Oyshe KU, Chowdhury PK, Debnath T, Rahman A, **Khan MS**. Computer vision-based six layered convneural network to recognize sign language for both numeral and alphabet signs. *Biomimetic Intelligence and Robotics.* 2024 Mar 1;4(1):100141. (**Link**)

Hasan MR, Rahman MM, Shahriar F, **Khan MS**, Uddin KM, Hasan MM. Smart farming: Leveraging IoT and deep learning for sustainable tomato cultivation and pest management. *Crop Design.* 2024 Nov 1;3(4):100079. (**Link**)

Rahman MM, Rana MR, Nur-A-Alam M, **Khan MS**, Uddin KM. A web-based heart disease prediction system using machine learning algorithms. *Network Biology.* 2022, 12(2): 64-80. [Rank: **Q1**, Impact Factor: **1.04**] (**Link**)

Book Chapters

Khan MS, Bhowmick PK, Islam N, Nasir MK, Uddin J. Breast Invasive Ductal Carcinoma Classification Based on Deep Transfer Learning Models with Histopathology Images. *Data Science and Data Analytics: Opportunities and Challenges.* 2021 Sep 22:249. (**Link**)

In Review

Khan MS, Gupta A, Seneviratne O, Patterson S. CFNet: Enhancing Explainability Through a Perturbation Based Counterfactual Explanation Method. [Submitted to AISTATS]

JOURNAL REVIEWER

- IEEE Access.
- Informatics in Medicine Unlocked.

PROFESSIONAL EXPERIENCE

Dhaka International University Badda, Dhaka
Lecturer, Computer Science Jan 2022-Jul 2023

Mawlana Bhashani Science and Technology University Santosh, Tangail
Research Assistant Jan. 2020 - Dec. 2021

Performed different data analysis tools such as pandas, NumPy, and machine learning algorithms to make robust predictive models on medical image, networking and environmental related datasets.

Mentors: Dr. Mostofa Kamal Nasir

SKILLS SUMMARY

1. **Programming :** C, C++, Python, Java. 2. **ML Libraries :** PyTorch, TensorFlow. 3. **Data Analysis Tools :** Pandas, Numpy, Matplotlib, Seaborn. 4. **Others :** MySQL, Oracle, CSS, JavaScript, Django.

PROGRAMMING BACKGROUND

Total Solve: 300+ **Mar. 2015 - Present**

- **UVa** : Handle: bappy_khan, Problems Solved: **120+**.
- **LightOJ :** Solve Count: **75+**.
- **LeetCode :** Handle: bappy_khan, Problems Solved: **30+**.
- **Kaggle :** Handle: bappy*123*, Contest Attended: **10+**.
- Took part in many online and inter department programming contests.

HONORS, AWARDS, AND FELLOWSHIPS

- Secured **3rd position** to obtain B.Sc. degree in the CSE department.
- Awarded the **Craft Research Fund Grant** (2023-2024) for research on *Efficient, Private, and Explainable Federated Learning for Financial Crime Detection.* (**Link**)
- Won the **best paper award** at *2nd International Conference on Trends in Computational and Cognitive Engineering (TCCE) 2020.* (**Link**)
- Won the **silver award** at *1st International Poster Competition on Achieving Sustainable Development Goals (SDGs) in Developing Countries.* (**Link**)
- Took a Workshop on ”Leveraging Machine Learning Approach to Software-Defined Network (SDN)” at *IEEE celebration day.* (**Link**)