S M Taslim Uddin Raju
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Career Summary

Machine Learning Engineer with 5+ years of experience in **AI for healthcare, medical imaging, and computer vision.** Specialized in **non-invasive health monitoring, multimodal learning, and digital pathology**, with **20+ publications** in leading venues. Holds a second MASc with hands-on expertise in **Graph Neural Networks (GNNs), Vision Transformers**, and **LLMs**, as well as a first **MSc** focused on **non-invasive hemoglobin and glucose estimation** using **smartphone PPG**—establishing a solid foundation **in signal processing and deep learning** for physiological measurement. Demonstrated success in delivering real-world ML/DL solutions and leading interdisciplinary research projects.

Research Interests

Generative AI, Digital Pathology, Non-Invasive Methods, Signal Processing, Large Language Models, Machine Learning and Deep Learning for Healthcare Solution, Medical Imaging,

Education

2023 – 2025 **MASc. in Electrical and Computer Engineering (ECE) | CGPA: - 85%**
University of Waterloo, Waterloo, ON N2L 3G1, Canada
Thesis: Advanced AI for Histopathological Whole Slide Image Classification and Captioning
Supervisor: Prof. Fakhri Karray

2019 – 2022 **MSc. in Computer Science and Engineering (CSE) | CGPA: - 4.00/4.00**
Khulna University of Engineering & Technology, Khulna, Bangladesh
Thesis: A Study on Hemoglobin and Glucose Levels Estimation Techniques Using Optimal PPG Characteristic Features of Smartphone Videos
Supervisor: Prof. M.M.A Hashem

2015 – 2019 **BSc. in Computer Science and Engineering (CSE) | CGPA: - 3.85/4.00**
Khulna University of Engineering & Technology, Khulna, Bangladesh
Thesis: A Study on Non-Invasive Hemoglobin Measurement Techniques
Supervisor: Prof. M.M.A Hashem

Technical Skills

Programming Languages	**Python** (Primary), C, C++, Java
ML & DL Frameworks	**Pytorch**, Scikit-learn, Tensorflow, Keras, OpenCV
Development Tools & IDEs	**VS Code, LaTeX/Overleaf**, Jupyter Notebooks,
Model Deployment & DevOps	Docker, Azure, Git
Database	Oracle 10g, MySQL

Research Positions and Grants

2023 – 2025 **University of Waterloo, Waterloo, ON N2L 3G1, Canada**
Lab: Pattern Analysis and Machine Intelligence
Position: Graduate Research Assistantship
Funding: $65000 (CAD)
Supervisor: Prof. Fakhri Karray

Publications

Published/Accepted Manuscripts

(C1) **S M Taslim Uddin Raju,** Md Rezwanul Haque, Md. Milon Islam, Hamdi Altaheri, and Fakhri Karray, "GNN-ViTCap: GNN-Enhanced Multiple Instance Learning with Vision Transformers for Whole Slide Image Classification and Captioning", *International Joint Conference on Neural Networks* (IJCNN 2025) **[Accepted, A*]**

(C2) **S. M. Taslim Uddin Raju,** Abdul Raqeeb Mohammad, Md. Milon Islam, and Fakhri Karray, "TransUAAE-CapGen: Caption Generation from Histopathological Patches through Transformer and UNet-Based Adversarial Autoencoder", ***IEEE International Conference on Systems, Man, and Cybernetics (IEEE SMC),*** IEEE, Borneo Convention Centre Kuching, Sarawak, Malaysia, 6 - 10 October 2024 [**B1 Conference**]

(J1) **S. M. Taslim Uddin Raju,** Safin Ahmed Dipto, Md Imran Hossain, Md. Abu Shahid Chowdhury, Fabliha Haque, Ayesha Tun Nashrah, Araf Nishan, Ashfaq Ahmad, and M. M. A. Hashem, "DNN-BP: A Novel Framework for Cuffless Blood Pressure Measurement from Optimal PPG Features using Deep Learning Model," ***Medical & Biological Engineering & Computing***, Springer, pp. 1–22, 2024.

(J2) Araf Nishan, **S. M. Taslim Uddin Raju,** Md Imran Hossain, Safin Ahmed Dipto, Asif Sijan, S. M. Tanvir Uddin, Md. Abu Shahid Chowdhury, and Md Mahamudul Hasan Khan, "A Continuous Cuffless Blood Pressure Measurement from Optimal PPG Characteristic Features using Machine Learning Algorithms," ***Heliyon,*** Elsevier, vol. 10, no. 6, 2024.

(C3) MD Jamil, Saimoon Oman, **S. M. Taslim Uddin Raju,** Fatema Soshi, "A Novel Framework for Enhancing Sensor Data Analysis: Label-Preserving Augmentation and Probabilistic Balancing", *26th International Conference on Computer and Information Technology (ICCIT),* IEEE, Cox's Bazar, Bangladesh, 13-15 December, 2023

(C4) Humaira Neha, Sadman Sakib, Farhan Sadaf, **S. M. Taslim Uddin Raju**, "Mobile Application to Collect Data and Measure Blood Component Level in a Non-Invasive Way", *26th International Conference on Computer and Information Technology (ICCIT),* IEEE, Cox's Bazar, Bangladesh, 13-15 December, 2023

(C5) Lamia Hossain, Ilma Hossain, **S. M. Taslim Uddin Raju,** Md. Shahidul Salim and Joy Saha**,** "A Novel Technique for Classification of Motor Imagery EEG Signal Based on Deep Learning Approaches," *2nd International Conference on Big Data, IoT and Machine Learning (BIM 2023),* Springer, Dhaka, Bangladesh, 6-8 September, 2023

(C6) Saimoon Al Farshi Oman, Md. Nafis Jamil, and **S. M. Taslim Uddin Raju,** "BCL: A Branched CNN-LSTM Architecture for Human Activity Recognition Using Smartphone Sensors," *International Conference on Next-Generation Computing, IoT and Machine Learning (NCIM 2023),* IEEE, DUET Gazipur, Bangladesh, 16-17 June, 2023

(C7) **S. M. Taslim Uddin Raju**, and M. M.M.A. Hashem, "Real-Time Hemoglobin Measurement Using Smartphone Video and Artificial Neural Network," *International Conference on Electrical, Computer & Telecommunication Engineering (ICECTE 2022),* IEEE, RUET, Rajshahi, Bangladesh, 29 – 31 Dec., 2022.

(C8) **S. M. Taslim Uddin Raju** and M. M. A. Hashem, "DNN Based Blood Glucose Level Estimation Using PPG Characteristic Features of Smartphone Videos," *25th International Conference on Computer and Information Technology (ICCIT 2022)*, IEEE, Cox's Bazar, Bangladesh, 17-19 Dec., 2022.

(C9) Towsif Ahamed Labib, Md. Nazrul Islam, **S. M. Taslim Uddin Raju** and M. M. A. Hashem, "Blood Donor Arrival Forecasting Using Regression Model and Analysis of Donor Behavioural Pattern," *25th International Conference on Computer and Information Technology (ICCIT 2022)*, IEEE, Cox's Bazar, Bangladesh, 17-19 Dec., 2022.

(J3) **S. M. Taslim Uddin Raju**, Amlan Sarker, Apurba Das, Md. Milon Islam, Mabrook S. Al-Rakhami, Atif M. Al-Amri, and Tasniah Mohiuddin , Fahad R. Albogamy, "An Approach for Demand Forecasting in Steel Industries Using Ensemble Learning," ***Complexity*****, Hindawi**, vol. 2022, Feb. 2022.

(C10) Farhan Sadaf, **S. M. Taslim Uddin Raju**, and Abdul Muntakim, "Offline Bangla Handwritten Text Recognition: A Comprehensive Study of Various Deep Learning Approaches" *2021 3rd International Conference on Electrical & Electronic Engineering (ICEEE 2021),* IEEE, RUET, Rajshahi, Bangladesh, 22 – 24 Dec., 2021.

(C11) Anik Ghosh, A. B. M. Aowlad Hossain and **S. M. Taslim Uddin Raju**, "Classification of Diabetic Retinopathy Using Few-Shot Transfer Learning from Imbalanced Data" *2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS)*, IEEE, Tamilnadu, India, 19 – 20 Mar., 2021.

(J4) Md. Kamrul Hasan, Shidhartho Roy, Chayan Mondal, Md. Ashraful Alam, Md. Toufick E Elahi, Aishwariya Dutta, **S. M. Taslim Uddin Raju**, Md. Tasnim Jawad, Mohiuddin Ahmad, "Dermo-DOCTOR: A framework for concurrent skin lesion detection and recognition using a deep convolutional neural network with end-to-end dual encoders," ***Biomedical Signal Processing and Control***, **Elsevier**, vol. 68, Mar. 2021.

(J5) Md. Rezwanul Haque, **S. M. Taslim Uddin Raju**, Md. Asaf-uddowla Golap, M. M. A. Hashem, "A Novel Technique for Non-Invasive Measurement of Human Blood Component Levels from Fingertip Video Using DNN Based Models," ***IEEE Access,*** vol. 9, pp. 19025 – 19042, IEEE, Jan. 2021.

(J6) Md. Asaf-uddowla Golap, **S. M. Taslim Uddin Raju**, Md. Rezwanul Haque, M. M. A. Hashem, "Hemoglobin and Glucose Level Estimation from PPG Characteristics Features of Fingertip Video Using MGGP-Based Model," ***Biomedical Signal Processing and Control,*** **Elsevier**, vol. 67, Jan. 2021.

(J7) Shah Muhammad Azmat Ullah, Md. Milon Islam, Saifuddin Mahmud, Sheikh Nooruddin, **S. M. Taslim Uddin Raju** and Md. Rezwanul Haque, "Scalable Telehealth Services to Combat Novel Coronavirus (COVID-19) Pandemic" ***SN Computer Science,*** **Springer**, vol. 2, no. 1, pp. 18, Jan. 2021.

(J8) Md. Milon Islam, Shah Muhammad Azmat Ullah, Saifuddin Mahmud and **S. M. Taslim Uddin Raju,** "Breathing Aid Devices to Support Novel Coronavirus (COVID-19) Infected Patients," ***SN Computer Science,*** Springer, vol. 1, no. 5, pp. 274, Aug. 2020.

(C12) **S. M. Taslim Uddin Raju**, and Md Shamimur Rahman, "Horizontal Vertical and SuperQueen Parity (HVSQ) Method for Soft Error Tolerance," *2020 IEEE Region 10 Symposium (TENSYMP),* IEEE, Dhaka, Bangladesh, pp. 1734-1737, 5-7 Jun., 2020.

Posters/Workshop Publications

(P1) **S. M. Taslim Uddin Raju,** and M. M. A Hashem, "Development of a Novel Non-invasive Smartphone-Based Blood Components Estimation Technique Using Python," PyCon US 2023, Salt Lake City, USA, 19-27 April

Book Chapter

(B1) Md Milon Islam, **S. M. Taslim Uddin Raju**, Sheikh Nooruddin, Fakhri Karray, and Ghulam Muhammad. "Internet of Health Things: an introduction." *In Blockchain and Digital Twin for Smart Healthcare*, pp. 19-44. Elsevier, 2025.

Submitted Manuscripts

(S1) **S. M. Taslim Uddin Raju**, Amlan Sarker, Apurba Das, Md. Milon Islam, S. M. Tanvir Uddin, Md. Ismail Hossain, and MD Piyal Mollah, "EwvEn: An Enhancing Weighted Voting Ensemble Algorithm for Demand Forecasting of Steel Industry," ***Heliyon***, **Elsevier**.

(S2) **S. M. Taslim Uddin Raju,** and Abdul Raqeeb Mohammad, "Enhancing Automated Medical Question-Answer Systems Using Fine-Tuned Large Language Models" *13th International Conference on Electrical and Computer Engineering (ICECE).*

(S3) Md Rezwanul Haque, Md. Milon Islam, **S M Taslim Uddin Raju**, Hamdi Altaheri, Lobna Nassar, and Fakhri Karray, "Multimodal Depression Detection through Mutual Transformer", *IEEE International Conference on Systems, Man, and Cybernetics (SMC), 2025.*

(S4) Md Rezwanul Haque, Md. Milon Islam, **S M Taslim Uddin Raju**, Hamdi Altaheri, Lobna Nassar, and Fakhri Karray, "MMFformer: Multimodal Fusion Transformer Network for Depression Detection", *IEEE International Conference on Systems, Man, and Cybernetics (SMC), 2025.*

(S5) Md. Najib Hasan, Sourav Basak Shuvo, Md. Mahadi Hasan Ankon, Souvika Sarkar, **S. M. Taslim Uddin Raju** and Nazmul Siddique, "TransfusionNet: Framework for Cervical Cancer Detection using Deep Learning with Multi-level Bi-Fusion and Aggregated-Fusion", ***Information Fusion,*** **Elsevier** [Manuscript Number: INFFUS-D-25-00008]

Professional Appointments

2023 – 2025	**University of Waterloo (UW), Waterloo, ON** Department of Electrical and Computer Engineering (ECE) **Teaching Assistant (TA)**
2020 – 2023 (study leave)	**Khulna University of Engineering & Technology (KUET), Khulna, Bangladesh** Department of Computer Science and Engineering (CSE) Lecturer
2019 – 2020	**Eastern University (EU), Dhaka, Bangladesh** Department of Computer Science and Engineering (CSE) Lecturer

Service and Outreach

Journal Reviews

- IEEE Access
- IEEE Sensors Letters
- One Plus
- Journal of Engineering, Wiley
- Journal of International Medical Research
- Scientific Reports – Nature
- Computer Methods in Biomechanics and Biomedical Engineering
- Signal, Image and Video Processing – Springer Nature
- Biomedical Engineering: Applications, Basis and Communications
- Technology and Health Care – Sage Journals

Conferences Reviews

- IEEE SMC 2024: IEEE International Conference on Systems, Man, and Cybernetics: 2024, 2025
- International Joint Conference on Neural Networks (IJCNN 2025)

Voluntary Experiences

- Collaboration work with one **blood organization project**, 10100 Dr. Martin Luther King Jr. St. N. St. Petersburg, **Florida 33716, USA** [2020-2021]
- Collaboration research with **King Saud University**, Saudi Arabia.

- **Instructor** for introductory workshop on C Programming in SGPIC (Special Group Interested in Programming Contest) [2016]
- Student Motivator and Examiner in **NHSPC** (National High School Programming Contest) [2016- 2017]

Fellowships, Honors, & Awards

2023	**Scholar Award, Conference on IEEE SMC 2024** **Funding: $500 (USD)**
2023	**Scholar Award, PyCon US Poster Presentation, Salt Lake City, Utah USA** **Funding: $2000 (USD)**
2023	**Vice Chancellor Awards for top researcher, Khulna University of Engineering & Technology** **Funding: $500 (USD)**
2016 – 2019	**Deans List, Khulna University of Engineering & Technology**
2016 – 2019	**Technical Scholarship, Khulna University of Engineering & Technology** **Funding: $250 (USD)/Year**

References

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