S M Taslim Uddin Raju

Victoria St N, Kitchener, ON, CA smturaju@uwaterloo.ca +1 (437) 663-5867
raju32742.github.io smturaju raju32742

Career Summary

Machine Learning researcher 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 **University of Waterloo, Waterloo, ON N2L 3G1, Canada**
MASc. in Electrical and Computer Engineering (ECE) | CGPA: - 85%
Thesis: Advanced AI for Histopathological Whole Slide Image Classification and Captioning
Specialized: Pattern Analysis and Machine Intelligence (Now Artificial intelligence)
Supervisor: Prof. Fakhri Karray

2019 – 2022 **Khulna University of Engineering & Technology, Khulna, Bangladesh**
MSc. in Computer Science and Engineering (CSE) | CGPA: - 4.00/4.00
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 **Khulna University of Engineering & Technology, Khulna, Bangladesh**
BSc. in Computer Science and Engineering (CSE) | CGPA: - 3.85/4.00
Thesis: A Study on Non-Invasive Hemoglobin Measurement Techniques
Supervisor: Prof. M.M.A Hashem

Research Positions and Grants

2023 – 2025 **Graduate Research Assistantship [Funding: $55000 (CAD)]**
University of Waterloo @ Pattern Analysis and Machine Intelligence (Now AI) Laboratory

- Conducted advanced research in digital pathology, AI for histopathological image analysis, and multimodal learning
- Collaborated with faculty and graduate researchers to support ongoing projects and contribute to lab meetings
- Developed novel architectures combining GNNs, Vision Transformers, and LLMs for clinical applications

Skill & Tools

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

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) Rifah Tasnim Haque Promi, Rezwana Akter Nazri, Md. Shahidul Salim, and **S. M. Taslim Uddin Raju,** "A Deep Learning Approach for Non-Invasive Hypertension Classification from PPG Signal" *International Conference on Next-Generation Computing, IoT and Machine Learning (NCIM 2023),* IEEE, DUET Gazipur, Bangladesh, 16-17 June, 2023

(C8) **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.

(C9) **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.

(C10) 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.

(C11) 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.

(C12) 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.

(C13) **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 **Teaching Assistant**
University of Waterloo @ Department of Electrical and Computer Engineering
Courses:
- Winter 2024: MTE 241 – Introduction to Computer Structures and Real-Time Systems
- Spring 2024: MTE 241 – Introduction to Computer Structures and Real-Time Systems
- Fall 2024: ECE 459 – Programming for Performance
- Winter 2025: ECE 222 – Digital Computers

2020 – 2023 (study leave) **Lecturer**
Khulna University of Engineering & Technology @ Department of Computer Science and Engineering
Courses:
- CSE 1101 – Structure Programming
- CSE 1102 – Structure Programming Laboratory
- CSE 2113 – Computer Architecture
- CSE 4112 – Machine Learning

2019 – 2020 **Lecturer**
Eastern University @ Department of Computer Science and Engineering
Courses:

- 06131205 – Structure Programming
- 06131206 – Structure Programming Laboratory
- 07142213 – Computer Architecture
- 05413109 – Numerical Methods

Services and Outreach

Journal Reviews

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

Conferences Reviews

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

Leadership & Co-curricular Activities

- Mentor, Winter 2025 Graduate Mentorship Program, University of Waterloo, providing guidance to new graduate students through UW's mentorship initiative [PDF]
- Mentor, System Development Project, KUET – Guided 3rd year undergraduates in designing and implementing innovative smartphone-based software solutions 2021 [PDF]
- Research Mentor, KUET – Supervised 3rd year undergraduates on deep learning and sensor-based projects, fostering research skills and teamwork 2022 [PDF]
- Supervisor, Capstone Project, KUET – Advised 4th year students in applying deep learning to biomedical data analysis, supporting project completion and publication 2023 [PDF]
- Supervisor, Capstone Project, KUET – Advised 4th year students on EEG signal classification using deep learning [PDF]
- Student Coordinator VP, Department of CSE, KUET, leading campus tours, coordinating student volunteers, and representing the department to prospective students and families

Voluntary Experiences

- Volunteer Member to assisting with conference logistics, attendee suppor for 5th International Conference on Electrical Information and Communication Technology (EICT) [2021]
- Collaboration work with one blood organization project, 10100 Dr. Martin Luther King Jr. St. N. St. Petersburg, Florida 33716, USA [2020-2021] [PDF]
- Collaboration research with **King Saud University**, Saudi Arabia [PDF]
- **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, IEEE International Conference on Systems, Man and Cybernetics (IEEE SMC) **[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)]** [PDF]
2022	Travel Grant, 25th International Conference on Computer and Information Technology (ICCIT 2022), IEEE, Cox's Bazar, Bangladesh **[Funding: $400 USD]**
2021	Travel Grant, 3rd International Conference on Electrical & Electronic Engineering (ICEEE 2021), IEEE, RUET, Rajshahi, Bangladesh **[Funding: $300 USD]**

2017 – 2018 **Dean's List**, outstanding academic performance, KUET [CGPA: 3.93/4.00] [PDF]

2016 – 2017 **Dean's List,** outstanding academic performance, KUET [CGPA: 3.94/4.00] [PDF]

2015 – 2016 **Dean's List,** outstanding academic performance, KUET [CGPA: 3.90/4.00] [PDF]

2016 – 2019 Technical Scholarship, Khulna University of Engineering & Technology [**Funding: $250 (USD)/Year]**

References

Dr. Fakhri Karray, PhD
Department of Electrical and Computer Engineering
Centre for Pattern Analysis and Machine Intelligence
University of Waterloo
200 University Avenue West, Waterloo, ON, Canada
Email: karray@uwaterloo.ca
Website: https://uwaterloo.ca/electrical-computer-engineering/profile/karray

Dr. M. M. A. Hashem
Dept. of Computer Science and Engineering
Khulna University of Engineering & Technology
Khulna-9203, Bangladesh.
Email: hashem@cse.kuet.ac.bd
Mobile: +8801714003949
Website: https://www.kuet.ac.bd/cse/hashem/