

MD FOKHRUL ISLAM

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RESEARCH INTEREST

Fields AI in Healthcare and Social Good, Robot learning, Computer Vision, Multi-modal Reasoning
Methods Deep Learning, Graph Representation Learning, Reinforcement Learning, Neural Networks

EDUCATION

University of Dhaka Dhaka, Bangladesh
Master of Science in Robotics and Mechatronics Engineering Feb, 2022 – July, 2023
CGPA: 3.79 out of 4.0

Bachelor of Science in Robotics and Mechatronics Engineering Feb, 2017 – Dec, 2021
CGPA: 3.45 out of 4.0 | Last 3 semester: 3.74/4.0

PUBLICATIONS & MANUSCRIPTS

- Swakshar Deb*, **Md Fokhrul Islam***, Shafin Rahman, Sejuti Rahman. Graph Convolutional Networks for Assessment of Physical Rehabilitation Exercises. Accepted in *IEEE Transactions on Neural Systems and Rehabilitation Engineering (TSNRE)*, 2022. (* denotes equal contribution) [\[paper\]](#), [\[code\]](#). Also appeared in CVPR 2022, *WiCV Workshop* [\[poster\]](#).
- Md Fokhrul Islam**, Sejuti Rahman, Shafin Rahman. Relation and Knowledge Aware Zero Shot Learning in 3D Object Recognition. Submitted to *Computer Vision and Image Understanding(CVIU)*. Under review. [\[paper abstract\]](#).
- Mohammad Tareq, **Md Fokhrul Islam**, Swakshar Deb, Sejuti Rahman, Abdullah Al Mahmud. Data-augmentation for Bangla-English Code-Mixed Sentiment Analysis: Enhancing Cross Linguistic Contextual Understanding. Accepted in *IEEE Access*, 2023. [\[paper\]](#), [\[code\]](#).
- Sejuti Rahman, Sujana Sarker, A. K. M. Nadimul Haque, Monisha Mushtary Uttsha, **Md Fokhrul Islam**, Swakshar Deb. AI-Driven Stroke Rehabilitation Systems and Assessment: A Systematic Review. Accepted in *IEEE Transactions on Neural Systems and Rehabilitation Engineering (TSNRE)*, 2022. [\[paper\]](#), [\[code\]](#).

SCHOLARSHIPS & AWARDS

- National Science & Technology (NST) Fellowship for **Excellent Master's Thesis** 2022-2023
- IFIC Bank Trust Fund **Research Grant (Highest & Consecutive 3 times)** 2021, 2022, 2023
- Winner in the Research Project Category**, Seminar on “Robotics in Bangladesh: Academia and Industry Initiatives” 2022
- 1st Runner-up Poster Presentation** in Dhaka University Research and Publication Fair 2022
- Bank Asia Higher Education Scholarship 2017-2021
- Islamic Bank (IBBL) Scholarship for Undergrad Studies 2017-2021

PROFESSIONAL DEVELOPMENT

- Attended OxML Summer School 2022 - Health Track [\[syllabus\]](#) [\[certificate\]](#) Jul 2022 - Aug 2022
Organizer: AI for Global Goals, CIFAR & University of Oxford's Deep Medicine Program
Topics covered: statistical / probabilistic Machine Learning(ML), representation learning, graph neural networks and geometrical deep learning, computer vision, knowledge-aware learning as well as topics related to ML in healthcare.
- Other online Certificates: (1) [AI for Medical Diagnosis](#) [↗](#) (2) [Deep Learning Specialization](#) [↗](#) 2020
- Bangladesh Robot Olympiad(BDRO) Volunteer | [certificate](#) [↗](#) Sept 2019

RESEARCH EXPERIENCE

Research Assistant

Supervisor: **Dr. Sejuti Rahman**

Oct, 2019 – Present

- **Relation and Knowledge Aware Zero Shot Learning in 3D Object Recognition (Master's thesis)** May, 2022 – July, 2023

Funding: *Bangladesh University Grants Commission for the fiscal year 2022-2023 and NST fellowship.*

Resources: [\[masters thesis book\]](#), [\[paper abstract\]](#)

- Developed a novel framework for class embedding learning that integrates knowledge base text and 2D visual information using GCN and co-attention mechanisms. Introduced an innovative Generalized Zero-Shot Learning (GZSL) framework incorporating embedding and feature generation models, enhanced by a contrastive module for instance-level supervision.
- Significantly improved performance, achieving an average 19.22% increase in the average harmonic mean and a 21.4% enhancement in unseen accuracy on ModelNet10 and ScanobjectNN datasets.

- **IHABOT: Intelligent Hospital Assistance Robot to Fight Contagion by Reducing Doctor-Patient Interaction** June, 2022 – Oct, 2022

Funding: *Centennial Research Grant, University of Dhaka*

Resources: [\[report\]](#), [\[demo\]](#)

- Designed and engineered an autonomous hospital assistance robot with advanced autonomous navigation, mapping capabilities, and proficiency in real-world navigation.
- Integrated a diverse array of sensors to acquire and analyze patients' physiological data, as well as evaluate their physical exercises.

- **Artificial Intelligence in Business Decision Making: A Study on Code-Mixed and Transliterated Bangla Customer Reviews** Feb, 2022 – May, 2022

Funding: *Centre for Advanced Research in Strategic Human Resource Management, University of Dhaka*

Resources: [\[paper\]](#), [\[report\]](#), [\[code\]](#)

- Proposed a novel data augmentation technique for enhancing cross-lingual contextual understanding, obviating the need for a parallel corpus.
- Collected and annotated a gold standard dataset, achieving substantial performance improvements over established word embedding methods on the same dataset.

- **An Intelligent Agent for Evaluating and Guiding the Post-Stroke Rehabilitation Exercises (Undergraduate thesis)** March, 2020 – Dec, 2021

Funding: *ICT Division, Ministry of Posts, Telecommunications, and Information Technology of the Government of Bangladesh*

Resources: [\[undergrad thesis book\]](#), [\[paper\]](#), [\[review paper\]](#), [\[code\]](#), [\[poster\]](#), [\[demo\]](#)

- Presented a novel spatio-temporal graph convolution framework designed for rehab. exercises.
- Introduced a guidance system featuring self-attention mechanisms to efficiently direct patients' attention toward the most informative joints during rehabilitation exercises.

- **Learning to Trade with Deep Q Learning** Oct, 2019 – Jan, 2020

Funding: *Centre for Advanced Research in Strategic Human Resource Management, University of Dhaka*

Resources: [\[report\]](#), [\[code\]](#)

- Developed a Reinforcement Learning model for stock trading using Deep DQN algorithm.
- Improved model performance by integrating trend analysis and sentiment information with NLP.

TECHNICAL SKILLS

Languages: Python, C/C++, SQL, Matlab, Julia

Frameworks: PyTorch, Tensorflow, Keras, Scikit-learn, HuggingFace, etc.

Others: Git, ~~LaTeX~~ \LaTeX , Solidworks, Arduino, Raspberry pi