



MD FOKHRUL ISLAM

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RESEARCH INTEREST

My research interests include multi-modal learning in low-data regimes and explainable machine learning, with a focus on vision and language. I am also interested in building automatic systems for healthcare, robotics, and social good, emphasizing graph representation learning, reinforcement learning, and machine perception.

EDUCATION

University of Dhaka

Master of Science in Robotics and Mechatronics Engineering
CGPA: 3.79 out of 4.0, Rank **3rd place**

Dhaka, Bangladesh

Feb, 2022 – July, 2023

Bachelor of Science in Robotics and Mechatronics Engineering

Feb, 2017 – Dec, 2021

CGPA: 3.45 out of 4.0 | Last 3 semester(or 54.5 credit hour): 3.74/4.0

PUBLICATIONS & MANUSCRIPTS

1. 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. [\[paper\]](#), [\[code\]](#). Also appeared in CVPR 2022, [WiCV Workshop](#) [\[poster\]](#)
2. **Md Fokhrul Islam**, Shafin Rahman, Sejuti Rahman. Relation and Knowledge Aware Zero Shot Learning in 3D Object Recognition. In preparation to submit at *Computer Vision and Image Understanding(CVIU)*. [\[paper abstract\]](#), [\[code\]](#)
3. 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. [\[paper\]](#), [\[code\]](#)
4. Sejuti Rahman, Sujan 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 [\[paper\]](#), [\[code\]](#)

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*

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

- 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: [\[paper\]](#), [\[code\]](#)
 - 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.

SCHOLARSHIPS & AWARDS

- National Science & Technology (NST) Fellowship for **Excellent Master’s Thesis** *2022-2023*
- IFIC Bank Trust Fund **Research Grants(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 ML, representation learning, graph neural networks and geometrical deep learning, computer vision, knowledge-aware ML as well as topics related to ML in healthcare.
- Other online Certificates: (1) AI for Medical Diagnosis [↗](#) (2) Deep Learning [↗](#) *2020*
- BanglaDesh Robot Olympiad(BDRO) Volunteer and mentor | certificate [↗](#) *Sept 2019*

TECHNICAL SKILLS

Languages: Python, C/C++, SQL, HTML/CSS, Matlab
Frameworks: PyTorch, Tensorflow, Keras, Scikit-learn, HuggingFace, etc.
Others: Solidworks, Robot Operating System, Arduino, Raspberry pi, Git, L^AT_EX, Ubuntu

REFERENCE

[Dr. Sejuti Rahman](#)

Associate professor & Chairperson, Robotics and Mechatronics Engineering, University of Dhaka

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