Md Kaykobad Reza

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Education

Doctor of Philosophy (Ph.D) — University of California, Riverside
Computer Science and Engineering — Spetember 2022 – Present
Research Topics: Multimodal Machine Learning, Computer Vision, MLLM — Supervisor: Dr. M. Salman Asif

Master of Science (M.Sc.) — University of California, Riverside
Computer Science and Engineering — Spetember 2022 – December 2024

Bachelor of Science (with Honors) — Bangladesh University of Engineering & Technology (BUET)
Computer Science and Engineering — February 2015 - April 2019
Research Topics: Natural Language Processing — Supervisor: Dr. M. Sohel Rahman

Research Interests and Publications

Research Interests

My research focuses on Multimodal Machine Learning, Computer Vision, and MLLM, with an emphasis on:

- Robust multimodal data fusion resilient to missing, noisy, occluded, and unaligned modalities.
- Incorporating new modalities into existing models with minimal computational overhead.
- Information extraction from noisy, unaligned, or low-resolution data, and test-time model adaptation.
- Model editing and merging for efficient multimodal systems with low data acquisition and training costs.

Tutorial: Foundations and Recent Trends in Robust Multimodal Learning — IEEE ICIP 2025
M. Salman Asif, Md Kaykobad Reza — Tutorial Website
This tutorial provides a comprehensive overview of multimodal learning, covering fundamentals, challenges, recent advances, and future directions, with a focus on robustness and real-world applications.

Robust Multimodal Learning with Missing Modalities via Parameter-Efficient Adaptation — IEEE TPAMI
Md Kaykobad Reza, Ashley Prater-Bennette, M. Salman Asif — arXiv | Webpage
Proposed a parameter efficient adaptation method for multimodal models that can enhance missing modality performance by up to 31.46% and applicable to diverse modality combinations, datasets and tasks.

MMSFormer: Multimodal Transformer for Material and Semantic Segmentation — IEEE OJSP
Md Kaykobad Reza, Ashley Prater-Bennette, M. Salman Asif — arXiv | Webpage | Code
Proposed a novel fusion strategy and model for multimodal material and semantic segmentation that outperforms current state of the art models in all modality combinations.

Multimodal Learning with Proxy Tokens — Asilomar 2025
Md Kaykobad Reza, Ameya Patil, Mashhour Solh, M. Salman Asif
Proposed proxy tokens combined with low-rank adapters to infer missing modality features from the available ones, thereby improving robustness across diverse missing-modality scenarios.

Robust Multimodal Learning via Cross-Modal Proxy Tokens — Under Review
Md Kaykobad Reza, Ameya Patil, Mashhour Solh, M. Salman Asif — arXiv
We propose Cross-Modal Proxy Tokens (CMPTs) with low-rank adapters to enhance missing modality robustness of multimodal models, outperforming state-of-the-art baselines across five datasets.

MMP: Towards Robust Multi-Modal Learning with Masked Modality Projection — Under Review
Niki Nezakati, Md Kaykobad Reza, Ameya Patil, Mashhour Solh, M. Salman Asif — arXiv | Webpage
Masked Modality Projection (MMP) trains a single model to handle missing modalities by learning to project available inputs, improving robustness across various missing modality scenarios.

Abstractive Summarization of Bengali Academic Videos Based on Audio Subtitles — Under Review
Lamisa Bintee Mizan Deya, Farhatun Shama, Abdul Aziz, Md Kaykobad Reza, Md Shahidul Salim
Proposed the first end-to-end pipeline to summarize Bengali academic videos and a new dataset to generate timestamped summaries and titles, enhancing accessibility for a low-resource language.

Model, Analyze, and Comprehend User Interactions within a Social Media Platform ICCIT 2024
Md Kaykobad Reza, S M Maksudul Alam, Yiran Luo, Youzhe Liu, Md Siam arXiv
Developed a graph-based approach to model and analyze social media user interactions, revealing key insights into community dynamics, user behavior, and content preferences.

Basin-wide groundwater level forecasting in Kumamoto, Japan: integrating transfer learning with Long Short-term Memory Network Hydrological Sciences Journal
A. T. M. Sakiur Rahman, Shahriar M Sakib, Md Kaykobad Reza, Amiya Basak, Khandaker Nusaiba Hafiz, Md Shazid Islam, Takahiro Hosono
We introduces a basin-wide groundwater level forecasting model that combines transfer learning with LSTM to improve predictive performance across diverse hydrogeological regions.

Automatic Summarization of Scientific Articles from Biomedical Domain IJCCI 2019
Md Kaykobad Reza, Rifat Rubayatul Islam, Sadik Siddique, Md. Mostofa Akbar, M. Sohel Rahman
Proposed an algorithm for generating summaries automatically that outperforms traditional methods.

Work Experience

Applied Scientist Intern (L5) January 2025 – June 2025
Amazon Lab126 Sunnyvale, California, USA

- **Topic:** Multimodal Machine Learning, Generative AI
- Designed and fine-tuned multimodal ML models for robust and generalizable real-world applications.
- Built scalable data preprocessing and evaluation pipelines for efficient model training and validation.
- Conducted research and experiments, documenting findings to advance applied AI initiatives.

Graduate Student Researcher September 2022 – Present
University of California, Riverside California, USA

- Proposed a parameter efficient adaptation technique for multimodal models that can enhance missing modality performance and applicable to diverse modality combinations, datasets and tasks.
- Designed a novel fusion strategy and model named MMSFormer for multimodal material and semantic segmentation that outperforms current state of the art models in all modality combinations.
- Proposed Masked Modality Projection (MMP) to train a single model to handle missing modalities by learning to project available inputs, improving robustness across various missing modality scenarios.
- Designed Cross-Modal Proxy Tokens (CMPTs) with low-rank adapters to enhance missing modality robustness of multimodal models, outperforming state-of-the-art baselines across five datasets.

Senior Engineer, Software Research & Engineering July 2019 – August 2022
bKash Limited (Joint venture of Money in Motion, Ant Group & SoftBank) Dhaka, Bangladesh

- Developed a solution for receiving remittance to bKash digital wallet directly from popular platforms like **Payoneer**, **Wise** and **Remitly** resulting in **17%** increase in total number of active users.
- Worked with **bKash Customer App** team to link bKash digital wallet to **36** government and private banks for real time and secure money transfers.
- Worked with **bKash Merchant App** team to build a real-time dashboard for small to large businesses.
- Collaborated with **bKash Payment Gateway** team for implementing fast and secure payment solution resulting in a **23.2%** increase in user engagement and **12.6%** increase in total yearly revenue.
- Our team also implemented send money, mobile recharge, cash out and deposit pension scheme (DPS).

Software Engineer, Mobile Application May 2019 – July 2019
Samsung Research & Development Institute, Bangladesh Dhaka, Bangladesh

- I worked as an iOS application developer and worked in Mobile Application Group - 1.
- My primary responsibilities were to develop mobile applications, ensure code quality and fix critical bugs.

Machine Learning Projects

Language generation using RNNLM (NLP Project) Deep Learning, Keras | Github

Used Quora question pair dataset to generate sentences for gap filling & template-based sentence generation.

Automated Lawn Mower (Hardware Project) Deep Learning, Computer Vision | Youtube
Automated device using computer vision, camera, sonar sensors to detect and cut grass, avoiding obstacles.

Weather Station (Microcontroller Project) Machine Learning, Microcontroller | Youtube
A compact device that monitors current weather, stores data, conducts analysis and predicts future weather.

Software Projects

Dyne: Meet Your Friends Over Food (Social Media App) Flutter, Firebase, NodeJs, Geolocation | Details
Social app for instant food meetups, exploring restaurants, chatting, coupons, fostering connections & savings.

Dorao: Your Running Companion (Fitness Tracker App) Flutter, Firebase, Django, Geolocation | Details
Track walks/runs, log time & distance, real-time stats, create group, complete daily challenges & earn rewards.

Procurement Institute (Tender Management Solution) Flutter, Firebase, In-App Purchase | Details
Find out all the gazetted tenders, see details, search or filter, save for later, subscribe for alerts and reminders.

Payvor: Pay & Get Paid for a Favor (Freelance Platform) Flutter, Firebase, C# .NET, Stripe | Details
Post job/apply for job, select preferred applicant, assign the job, get the work done, make payment or get paid.

Tourist Guide App Flutter, Firebase, Geolocation, In-App Purchase | Details
Find out hotels, tourist spots, restaurants, transportation, events, adventures and everything at your fingertips.

Pessa: Real-Time Financial Transaction (FinTech App) Flutter, Firebase, C# .NET | Details
All-in-one mobile wallet for seamless money management. Add money, send funds instantly, cash out, & more.

Cherished Prayers (Social Media for the Pious) Flutter, Firebase, Django, Real-Time Chat | Details
Record, share, seek solutions, connect with others via chat, groups, and feedback for an enriched experience.

Skills

Soft Skills	Communication, Collaboration, Problem Solving
Programming Languages	Python, Dart, Java, C/C++
Library/Frameworks	PyTorch, TensorFlow, Huggingface, Scikit-learn, OpenCV, NumPy, Pandas, Matplotlib, Flutter, Django
Database	MySQL, PostgreSQL, HBase, Firebase Firestore, Firebase Realtime DB
Software/Technologies	Anaconda, PyCharm, Android Studio, VSCode, Firebase, RestAPI, GraphQL, FastAPI, Git

Services

Reviewer	IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)	2024-2026
Reviewer	The 39^{th} Annual Conference on Neural Information Processing Systems (NeurIPS)	2025
Reviewer	The 59^{th} Annual Asilomar Conference on Signals, Systems, and Computers	2025
Reviewer	International Conference on Computer Vision (ICCV)	2025
Reviewer	IEEE Transactions on Computational Imaging (IEEE TCI)	2025

Leadership

Vice President	Greater Rangpur Students' Welfare Association, BUET	Aug 2018 – May 2019
Class Representative	Department of Computer Science & Engineering, BUET	April 2016 - April 2019

Awards

Dean's Distinguished Fellowship	University of California, Riverside	Fall'22 - Spring'23
Department Dean's List Award	Bangladesh University of Eng. & Tech. (BUET)	2015 - 2019
University Merit Scholarship	Bangladesh University of Eng. & Tech. (BUET)	2015 - 2019
MetLife Pathways Scholarship	MetLife Foundation	2015 - 2018
Education Board Scholarship	Bangladesh Education Board	2012 - 2018