Rifat Rafiuddin

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Summary

PhD student focusing on **multimodal ML** and **real-time signal processing**. Build **low-latency, on-device inference pipelines**, with **profiling-driven optimizations** for **throughput**, **memory**, and **power**.

Education

- **Oklahoma State University** — Stillwater, OK, USA
  Ph.D. in Computer Science — *Aug 2022 – Jul 2027 (Expected)*
- **Rajshahi University of Engineering and Technology (RUET)** — Rajshahi, Bangladesh
  B.Sc. in Computer Science and Engineering — *Jan 2012 – Oct 2016*

Skills Summary

- **Programming Languages**: C, C++, Java, Python
- **Frameworks & Libraries**: NumPy, pandas, Matplotlib, Seaborn, NLTK, Scikit-learn, TensorFlow, PyTorch
- **DevOps & Cloud**: Docker, Kubernetes, Amazon AWS, Git, Linux
- **Big Data & DBMS**: Hadoop, Apache Spark, MySQL, Oracle, PL/SQL
- **Tools & Scientific Platforms**: LaTeX, Adobe Illustrator, Adobe Photoshop, Matlab, Unity, Blender

Experience

- **Oklahoma State University, rAIson Lab** — Stillwater, OK, USA
  Graduate Researcher, Multimodal ML & Real-Time Signal Processing — *Aug 2022 – Present*
  - **Real-time cross-modality pipeline**:

    Implemented *Edu-EmotionNet* (ICMLA 2025, Core C), CMAA (cross-modality attention alignment) + MIE (modality confidence) + TFL (temporal feedback), for online learning emotions; on re-annotated IEMOCAP/MOSEI (confused, bored, curious, frustrated) achieved **0.88** accuracy and **0.86** macro-F1 (**+4 pp** vs HybridFusion) and remained robust with **60%** modality drop (0.88→0.85); audio: 40-dim MFCCs (25 ms/10 ms), video: 224×224@30 fps, text: BERT.

  - **Attention alignment for multimodality**:

    Developed **context-aware adaptive attention for MABSA** (ASONAM 2025, Core B, ∼25% AR) with visual-to-text relevance, syntactic-guided masking, aspect-aware captions, and *aspect-specific balancing*. Achieved **F1=71.9** on Twitter-15 (ties SOTA) and **F1=71.62** on Twitter-17 (**+0.6 pp** over best prior); ablation shows aspect-specific balancing is most critical (−7.19/−5.90 F1 when removed on T15/T17). Also built **cross-modality attention alignment with temporal feedback loops** (ICMLA 2025) for online emotion learning.

  - **Memory-efficient LLM inference**:

    For EMNLP Findings 2025 (Core A*), proposed **Adaptive Retention**: layer-wise probabilistic token retention with Hard–Concrete gating and a Lagrangian budget. At **30–50%** retention it preserves ≥**95%** of full-model performance, reduces peak memory by ∼**35–45%**, and improves throughput by up to 1.80× without modifying base attention; matches or is near-dense on SST-2/IMDb/ArXiv and maintains QASPER F1 at **65.0/63.0** (50%/30%).

  - **Profiling & experimental engineering**:

    Engineered the end-to-end ABSA pipeline for *Adaptive Contextual Masking* (PAKDD 2024, Core B, 18.47% AR): reproduced baselines (LCF-BERT-CDW/CDM, MGGCN-BERT, AMA-GLCF, AM Word/Weight-BERT) with standardized SemEval-14/15/16 preprocessing and metrics; BERT-base-cased training for 50 epochs (batch 32, lr 2×10^{-5}, dropout 0.1, L2 0.01) on 3×NVIDIA A10 GPUs. Achieved ACTM-ASC best-in-paper results on 3/4 datasets (e.g., **Acc.=91.05/93.49** on Restaurant14/16) and ACTM-ATE **F1=80.34** on Laptop14; ran aggregator ablations (Mean/Median/SD) and logged all runs for reproducibility.

- **Oklahoma State University** — Stillwater, OK, USA
  Graduate Teaching Assistant — *Aug 2022 – Present*
  - **Course Assistance**: Assisted in teaching 150+ students in Computer Security, OS Design, and Algorithm Analysis.
  - **Mentorship**: Led labs, graded assignments, and mentored students in systems and algorithmic courses.
  - **Content Design**: Designed assignments and exams to reinforce hands-on and conceptual understanding.
- **University of Asia Pacific** — Dhaka, Bangladesh
  Lecturer — *Oct 2018 – Jul 2022*
  - **Course Instruction**: Delivered core CS courses and labs using interactive, applied teaching strategies.
  - **Programming Team Coaching**: Coached RUET IUPC 2019 programming team to notable competitive success.
  - **Curriculum Development**: Contributed to OBE-based curriculum enhancement through IQAC workshops.

Projects

- **Image Embedding and Classification (Vision, Deep Learning)**: Implemented Xception-based pipeline to extract and visualize high-dimensional image embeddings with downstream classification; built clean training/evaluation scripts and TensorBoard 2D/3D demos. Tech: TensorFlow, NumPy, Matplotlib (2021). [GitHub]
- **GAN-based Data Augmentation for Bangla Characters (Generative Models, Low-Resource Vision)**: Applied adaptive discriminator augmentation to stabilize GAN training on limited data; produced robust character/numeral synthesis with visual demos and reproducible configs. Tech: PyTorch, GANs, OpenCV (2021). [GitHub]
- **Breast Cancer Detection with Deep Learning (Medical Imaging, CNNs)**: Built and compared Inception, VGG16, MobileNet, and Transformer-based models for IDC detection in histopathology images; constructed an end-to-end data pipeline and evaluation on Kaggle IDC. Tech: TensorFlow, Keras, NumPy (2021). [GitHub]
- **GO–CART , 3D Unity Game (Real-Time Graphics & Physics)**: Designed a Unity/C# 3D racer with real-time gameplay loop: WASD controls, third-person camera, physics-based handling, collision detection, scoring and game-over logic; tuned for smooth interaction. Tech: Unity, C# (2021). [GitHub]
- **Adaptive Blockchain with Dynamic Difficulty & SJF (Systems, Queuing)**: Simulated blockchain under high-load; integrated dynamic difficulty control and Shortest-Job-First prioritization via min-heap to improve throughput and reduce queue length/wait time; course project (OSU CS5113). Tech: Python, Priority Queues (2024). [GitHub]

Selected Publications

- **Rafiuddin, S. M. (Forthcoming 2025). Edu-EmotionNet: Cross-Modality Attention Alignment with Temporal Feedback Loops.**: In *Proceedings of the 24th IEEE International Conference on Machine Learning and Applications (ICMLA 2025)* (Regular). **[CORE C]**
- **Rafiuddin, S. M., & Khan, M. N. (Forthcoming 2025). Learning what to remember: Adaptive probabilistic memory retention for memory-efficient language models.**: In *Findings of the Association for Computational Linguistics: Conference on Empirical Methods in Natural Language Processing (EMNLP) 2025* (Short). **[CORE A*]**
- **Rafiuddin, S. M., Kamal, S., Rakib, M., Bagavathi, A., & Sen, A. (Forthcoming 2025). AdaptiSent: Context-Aware Adaptive Attention for Multimodal Aspect-Based Sentiment Analysis.**: In *Proceedings of the 17th International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2025)* (Short). **[CORE B] (Acceptance Rate: ∼25%)** [Presentation]
- **Rafiuddin, S. M., Rakib, M., Kamal, S., & Bagavathi, A. (2024, April). Exploiting Adaptive Contextual Masking for Aspect-Based Sentiment Analysis.**: In *Pacific-Asia Conference on Knowledge Discovery and Data Mining* (pp. 147–159). Singapore: Springer Nature Singapore. **[CORE B] (Acceptance Rate: 18.47%)** [arXiv] [Presentation]

Work Authorization

CPT-eligible for **Summer 2026 internship** (May–Aug); at least one academic term remaining after internship.

Honors and Awards

- **AIRS Travel Fund, Oklahoma State University (2025)**: Awarded travel funding to support conference participation and research dissemination.
- **GPSGA Travel & Research Award, Oklahoma State University (2024)**: Awarded **USD 600** for conference and research support. [Link]
- **Honorable Mention, ICT Fest**: Islamic University of Technology (2014)
- **Honorable Mention, NCPC**: Daffodil International University (2014)
- **Champion, ICT Olympiad – CSE Fest**: RUET (2012)

Voluntary Services

- **National High School Programming Contest (NHSPC), Rajshahi**: *Volunteer* 2016
- **Divisional Mathematical Olympiad, Faridpur**: *Math Olympiad Volunteer (MOVer)* 2006
- **Reviewed research papers for COLING (2024), ICWSM (2026), IJCNN (2024), and PAKDD (2025)**: *Reviewer*

References

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