ABRAR RAHMAN ABIR

Email: abir@berkeley.edu • Google Scholar • **GitHub:** https://github.com/abrarrahmanabir
• **Homepage:** https://abrarrahmanabir.github.io • Permanent Resident of the United States

RESEARCH INTERESTS

Machine Learning, Deep Generative Models, Computational Biology, Single-cell Omics.

EDUCATION

University of California, Berkeley, Berkeley, CA, USA 2026 — 2031 (expected)
Ph.D. in **Computer Science**.
Electrical Engineering and Computer Sciences Department.

Bangladesh University of Engineering and Technology, Dhaka, Bangladesh 2022 — 2026
Bachelor of Science in **Computer Science and Engineering**.

PUBLICATIONS (8 in Q1 Journals, 1 in NeurIPS, 88 Citations)

** denotes equal contribution*

1. **Abrar Rahman Abir***, Haz Sameen Shahgir*, Md Rownok Zahan Ratul, Md Toki Tahmid, Greg Ver Steeg, Yue Dong
AbFlowNet: Optimizing Antibody-Antigen Binding Energy via Diffusion-GFlowNet Fusion. arxiv : `https://arxiv.org/pdf/2505.12358`
NeurIPS, 2026.

2. **Abrar Rahman Abir***, Sajib Acharjee Dip*, Liqing Zhang.
CFM-GP: Unified Conditional Flow Matching to Learn Gene Perturbation Across Cell Types. DOI: `https://doi.org/10.1093/nargab/lqag087`
NAR Genomics and Bioinformatics, 2026.

3. **Abrar Rahman Abir**, Md Toki Tahmid, Rafiqul Islam Rayan, M Saifur Rahman.
DeepRNA-Twist: Language Model guided RNA Torsion Angle Prediction with Attention-Inception Network. DOI : `https://doi.org/10.1093/bib/bbaf199`
Briefings in Bioinformatics, 2025.

4. **Abrar Rahman Abir***, Md Toki Tahmid*, M Saifur Rahman.
LOCAS: Multi-label mRNA Localization with Supervised Contrastive Learning. DOI : `https://doi.org/10.1093/bib/bbaf441`
NeurIPS Machine Learning in Structural Biology Workshop, 2024.
Briefings in Bioinformatics, 2025

5. **Abrar Rahman Abir**, Liqing Zhang.
RNA-EFM: Energy based Flow Matching for Protein-conditioned RNA Sequence-Structure Co-design.
DOI : `https://doi.org/10.1093/bioadv/vbaf258`
ICLR GEM Workshop, 2025.
Bioinformatics Advances, 2025.

6. **Abrar Rahman Abir**, Sajib Acharjee Dip, Liqing Zhang.
UnCOT-AD: Unpaired Cross-Omics Translation Enables Multi-Omics Integration for Alzheimer's Disease Prediction. DOI : `https://doi.org/10.1093/bib/bbaf438`
Briefings in Bioinformatics, 2025.

7. **Abrar Rahman Abir**, Muhammad Ali Nayeem, M Sohel Rahman, Adnan Arefeen.
GTG-ACO: Graph Transformer Augmented Ant Colony Optimization for Learning Heuristics and Pheromone Dynamics for Combinatorial Optimization. DOI : `https://doi.org/10.1016/j.swevo.2025.102147`
Swarm and Evolutionary Computation, 2025.

8. **Abrar Rahman Abir***, Md Toki Tahmid*, Md Shamsuzzoha Bayzid.
BioLLMNet: Enhancing RNA-Interaction Prediction with a Specialized Cross-LLM Transformation Network. DOI : `https://doi.org/10.1093/bib/bbaf549`
Briefings in Bioinformatics, 2025.

9. **Abrar Rahman Abir**, Muhtasim Noor Alif, Wencai Zhang, Khandakar Tanvir Ahmed, Wei Zhang.
DCGAT-DTI: Dynamic Cross Graph Attention Network for Drug-Target Interaction Prediction. DOI : https://doi.org/10.1093/bioadv/vbaf306
Bioinformatics Advances, 2025.

10. **Abrar Rahman Abir**, Anik Saha, Md Shamsuzzoha Bayzid.
MACS: Multi Domain Adaptation Facilitates Accurate Connectomics Segmentation. biorxiv : https://www.biorxiv.org/content/10.1101/2025.09.30.679580.full.pdf
Under Review at Briefings in Bioinformatics, 2026.

11. **Abrar Rahman Abir***, Anik Saha*, Shashata Sawmya, Thomas L. Athey, Nir N Shavit, Md Shamsuzzoha Bayzid.
MExConn: A Mechanistically Interpretable Multi-Expert Framework for Multi-Organelle Segmentation in Connectomics. biorxiv : https://www.biorxiv.org/cgi/content/short/2025.11.19.689394v1
Under Review at Bioinformatics, 2026.

12. **Abrar Rahman Abir***, Anik Saha*, Ruwad Naswan, Md. Shamsuzzoha Bayzid.
ConnectoFM: A Foundation Model for Learning the Language of the Connectome. DOI : https://doi.org/10.64898/2026.06.06.730367

13. **Abrar Rahman Abir**, Muhtasim Noor Alif, Wei Zhang.
ST-DISTAL : Learning Spatial Transcriptomics Deconvolution via Spectral-Spatial Dual-Branch GCNs with Distributional Alignment. biorxiv : https://www.biorxiv.org/content/10.64898/2026.09.27.754868v1.full.pdf

14. **Abrar Rahman Abir**.
A Machine Learning Based Novel Approach of Predicting International Roughness Index (IRI) from Traffic Characteristics using Random Forest Regression. DOI : https://dl.acm.org/doi/abs/10.1145/3639592.3639598
Proceedings of the 2023 6th Artificial Intelligence and Cloud Computing Conference, 2023.

15. Sajib Acharjee Dip, UA Shuvo, D Mallick, **Abrar Rahman Abir**, Liqing Zhang.
MOXGATE: Modality-Aware Cross-Attention for Multi-Omic Gastrointestinal Cancer Sub-Type Classification. https://openreview.net/pdf?id=QiNk4dOiBE
ICLR 2025 Workshop on AI for Nucleic Acids, 2025.

16. Swaranjit Roy, **Abrar Rahman Abir**, Mehedi A Ansary.
Use of CPT and other parameters for estimating soil unit weight using optimised machine learning models. DOI : https://link.springer.com/article/10.1007/s12145-025-01756-6
Earth Science Informatics, 2025.

POSTER PRESENTATION

1. **Abrar Rahman Abir**, Sajib Acharjee Dip, Liqing Zhang. ***CFM-GP: Unified Conditional Flow Matching to Learn Gene Perturbation Across Cell Types***.
ISMB 2025.

2. **Abrar Rahman Abir**, Khandakar Tanvir Ahmed and Wei Zhang. ***DCGAT-DTI : Dynamic Cross Graph Attention Network for Drug-Target Interaction Prediction***.
RECOMB 2025.

3. **Abrar Rahman Abir**, Sajib Acharjee Dip, Liqing Zhang. ***Multi-Omics Fusion for Alzheimer's Disease Prediction: A Novel Unpaired Cross-Omics Translation Approach***.
RECOMB 2025.

4. **Abrar Rahman Abir**, Md Toki Tahmid, Rafiqul Islam Rayan and M Saifur Rahman. ***Deciphering the Twists of RNA: RNA Torsion Angle Prediction with Attention-Inception Leveraging RNA Language Model***.
ISMB 2024.

5. **Abrar Rahman Abir**, Md Toki Tahmid and M Saifur Rahman. ***Multi-Label Contrastive Learning Augmented mRNA Subcellular Localization Prediction Leveraging RNA Language Model***.
ISMB 2024.

RESEARCH EXPERIENCE

1. **Graduate Student Researcher.** 2026-Present.
University of California, Berkeley.
Supervisor: Dr. Allon Wagner.
Generative Models for Single-cell Metabolomics.
2. **Research Intern.** 2024-2025.
University of Central Florida.
Supervisor: Dr. Wei Zhang.
Drug-Target Interaction Prediction, Cell-type Deconvolution in Spatial Transcriptomics.
3. **Research Intern.** 2024-2025.
Virginia Tech.
Supervisor: Dr. Liqing Zhang.
Multi-omics Integration for Alzheimer's Disease Prediction, Gene Perturbation Prediction, RNA Sequence-Structure Co-design.
4. **Undergraduate Research Assistant.** 2023-2025.
Bangladesh University of Engineering and Technology.
Supervisors: Dr. Md Shamsuzzoha Bayzid, Dr. M Saifur Rahman.
Computational Connectomics, Multimodal Representation Learning for Biology, RNA Torsion Angle Prediction, mRNA Subcellular Localization Prediction.

REVIEWER

- NeurIPS Machine Learning in Structural Biology Workshop. 2024, 2025.
- Briefings in Bioinformatics.
- Bioinformatics.
- BMC Genomics.
- BMC Bioinformatics.
- Neural Networks.

AWARDS

1. **EECS Gold Fellowship**, UC Berkeley. 2026. (Sole recipient in the AI-Science area.)
2. **Dean's List Award** in each year for academic excellence, BUET. 2022-2026.
3. **University Merit Scholarship** in each year for outstanding academic results, BUET. 2022-2026.

TECHNICAL SKILLS

Languages	Python, C, C++, Java, JavaScript, Bash, Flex/Bison, SQL.
Frameworks/Tools	PyTorch, TensorFlow, Keras, Git, LaTeX.
Libraries	NumPy, Pandas, SciPy, Matplotlib, Seaborn, Scikit-Learn and other ML libraries.

REFERENCES

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Professor, Computer Science, Virginia Tech
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Dr. Wei Zhang.
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