

Md Toki Tahmid

☎ (+880) 1759830318 | ✉ sharifulislamtoki@gmail.com | 🌐 <https://tokitahmid64.github.io/>

Research Interests

- 🧠 Natural Language Processing for Genomic and Biomedical Data
- 📊 Machine Learning for Computational Biology
- 🌐 Graph Neural Networks for Biological Networks and Interactions
- 🔧 Development of Foundation Models for Multi-modal Biomedical Applications

Education

Bangladesh University of Engineering and Technology (BUET)

B.S. IN COMPUTER SCIENCE AND ENGINEERING

CGPA : 3.98/4.00

Dhaka, Bangladesh

April, 2019 - July 2024

Journal Publications

1. TransBind allows precise detection of DNA-binding proteins and residues using language models and deep learning

ACCEPTED @ NATURE COMMUNICATIONS BIOLOGY

November, 2024

Md. Toki Tahmid, A.K.M. Mehedi Hasan, Md Shamsuzzoha Bayzid

2. MD-CardioNet: A Multi-Dimensional Deep Neural Network for Cardiovascular Disease Diagnosis from Electrocardiogram

ACCEPTED AND PUBLISHED @ IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS [CITATION : 4]

August, 2023

MT Tahmid, ME Kader, T Mahmud, SA Fattah

3. Forecasting COVID-19 cases: A comparative analysis between recurrent and convolutional neural networks

ACCEPTED AND PUBLISHED @ RESULTS IN PHYSICS 24, 104137 [CITATION : 74]

May, 2021

KN Nabi, MT Tahmid, A Rafi, ME Kader, MA Haider

4. A ubiquitous method for predicting underground petroleum deposits based on satellite data

ACCEPTED AND PUBLISHED @ NATURE SCIENTIFIC REPORTS 13 (1), 6638

April, 2023

S Newaz, MT Tahmid, N Al-Aboody, ABMAA Islam

5. Escalating post-disaster rescue missions through ad-hoc victim localization exploiting Wi-Fi networks

ACCEPTED AND PUBLISHED @ HELIYON 8 (5) [CITATION : 5]

May, 2022

TA Khan, TR Toha, SI Salim, MT Tahmid, ABMA Al Islam

Conference and Workshop Publications

1. BiRNA-BERT: Adaptive Tokenization for Efficient RNA Language Modeling

ACCEPTED @ NEURIPS WORKSHOP ON ENLSP, 2024 (SPOTLIGHT); UNDER MAJOR REVISION @ NATURE

Sept, 2024

COMMUNICATIONS BIOLOGY [CITATION : 3] | COLLABORATION: UNIVERSITY OF CALIFORNIA, RIVERSIDE

Md Toki Tahmid, H.A.Z Sameen Sagir, Sazan Mahbub, Yue Dong, Md Shamsuzzoha Bayzid

2. Structure Matters: Deciphering Neural Network's Properties from its Structure

ACCEPTED @ SYMMETRY AND GEOMETRY IN NEURAL REPRESENTATIONS, NEURIPS 2024 | COLLABORATION:

Nov, 2024

COMPUTATIONAL CONNECTOMICS LAB, MIT

Shashata Sawmya, Md Toki Tahmid, Gourab Saha, Arpita Saha, Nir N Shavit, Lu Mi (Joined Co-First Author)

3. TomoPicker: Annotation-Efficient Particle Picking in cryo-electron

Tomograms

ACCEPTED @ NEURIPS WORKSHOP ON MLSB, 2024 | COLLABORATION: XULAB, CARNEGIE MELLON UNIVERSITY

Nov, 2024

Mostofa Rafid Uddin, Ajmain Yasar Ahmed, **Md Toki Tahmid**, Md Zarif Ul Alam, Zachary Freyberg, Min Xu

4. RNA-DCGen: Dual Constrained RNA Sequence Generation with LLM-Attack

ACCEPTED @ NEURIPS WORKSHOP ON MLSB, 2024

Sept, 2024

Haz Sameen Shahgir*, Md Rownok Zahan Ratul*, **Md Toki Tahmid***, Khondker Salman Sayeed, Atif Rahman (Joined Co-First Author)

5. LOCAS: Multi-label mRNA Localization with Supervised Contrastive Learning

ACCEPTED @ NEURIPS WORKSHOP ON MLSB, 2024

Sept, 2024

Abrar Rahman Abir*, **Md Toki Tahmid***, M Saifur Rahman (Joined Co-First Author)

6. EmbedSimScore: Advancing Protein Similarity Analysis with Structural and Contextual Embeddings

ACCEPTED @ NEURIPS 2024 WORKSHOP: SELF-SUPERVISED LEARNING - THEORY AND PRACTICE

Sept, 2024

Gourab Saha*, **Md Toki Tahmid***, Md. Shamsuzzoha Bayzid (Joined Co-First Author)

7. Analyzing Impacts on Physiological Aspects of Rickshaw Pullers due to Heat Exposure

ACCEPTED: @ 11TH NSYSS, 2024

May, 2024

Masfiqur Rahaman, Maoyejatun Hasana, Razin Reaz Abedin, Mizanur Rahaman, **Md Toki Tahmid**, Sudipa Saha, MD Zahidul Islam

Sanjid, Mahir Shahriar Dhrubo, Samira Akter, Sutapa Dey Tithi, Kazi Abdun Noor, Zarin Tasnim Promi, Duncan Watson Paris, Tanzeem

Chowdhury, A. B. M. Alim Al Islam, Tauhidur Rahman

8. Long-Range Low-Cost Networking for Real-Time Monitoring of Rail Tracks in Developing Countries

ACCEPTED AND PUBLISHED @ PROCEEDINGS OF THE 2022 INTERNATIONAL CONFERENCE ON INFORMATION AND

June, 2022

COMMUNICATION TECHNOLOGIES AND DEVELOPMENT

Saiful Islam Salim, Uday Kamal, Adnan Quaium, Mainul Hossain, Masfiqur Rahaman, Nazmul Hasan Sakib, **Md Toki Tahmid**, ABM Alim

Al Islam

9. Artificial Intelligence Based Cybersecurity: Two-Step Suitability Test

IEEE INTERNATIONAL CONFERENCE ON SERVICE OPERATIONS AND LOGISTICS, AND INFORMATICS, SOLI [CITATION :

December, 2021

5]

Sajjad Waheed Shah Md Istiaque, **Md Toki Tahmid**, Asif Iqbal Khan, Zaber Al Hassan

Preprints

1. wQFM-TREE: highly accurate and scalable quartet-based species tree inference from gene trees

BIORXIV (UNDER REVIEW @ BIOINFORMATICS ADVANCES)

July, 2024

Abdur Rafi, Ahmed Mahir Sultan Rumi, Sheikh Azizul Hakim, Sohaib Sohaib, **Md Toki Tahmid**, Rabib Jahin Ibn Momin, Tanjeem Azwad

Zaman, Rezwana Reaz, Md Shamsuzzoha Bayzid

2. BioLLMNet: Enhancing RNA-Interaction Prediction with a Specialized Cross-LLM Transformation Network

BIORXIV (UNDER REVIEW @ BRIEFINGS IN BIOINFORMATICS)

Sept, 2024

Md Toki Tahmid, Abrar Rahman Abir, Md Shamsuzzoha Bayzid

3. DeepRNA-Twist: Language Model guided RNA Torsion Angle Prediction with Attention-Inception Network

BIORXIV UNDER REVIEW @ BRIEFINGS IN BIOINFORMATICS)

Sept, 2024

Abrar Rahman Abir, **Md Toki Tahmid**, Rafiqul Islam Rayan, M Saifur Rahman

4. Advancing Noninvasive Mechanical Ventilation: Simulating Techniques for Improved Respiratory Care

BIORXIV

Nov, 2024

Md Toki Tahmid, Mrinmoy Nandi Bappa

5. GraFusionNet: Integrating Node, Edge, and Semantic Features for Enhanced Graph Representations

BIORXIV

Nov, 2024

Md Toki Tahmid, Tanjeem Azwad Zaman, M. Saifur Rahman

6. A Paradigm Shift in Mouza Map Vectorization: A Human-Machine Collaboration Approach

BIORXIV (SUBMITTED TO @ IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE

July, 2024

Mahir Shahriar Dhruho, Samira Akter, Anwarul Bashir Shuaib, Md Toki Tahmid, Zahid Hasan, ABM Islam

7. Connecting the Dots: Leveraging Spatio-Temporal Graph Neural Networks for Accurate Bangla Sign Language Recognition

ARXIV

July, 2023

Haz Sameen Shahgir, Khondker Salman Sayeed, Md Toki Tahmid, Tanjeem Azwad Zaman, Md Zarif Ul Alam

Experience

1. Undergraduate Research Assistant

CSE, BUET

SUPERVISOR: MD SHAMSUZZOHA BAYZID

Jul. 2021 - Dec. 2024

• Responsibilities and Experience

- Developed deep learning architectures for DNA-protein interaction prediction and hypergraph neural networks for protein-protein interaction prediction.
- Proposed BiRNA-BERT, a language model for RNA sequence analysis, using an adaptive dual tokenization scheme.
- Collaborated on computational proteomics and genomic studies to improve efficiency and scalability of bioinformatics tasks.

• Publications

- **BiRNA-BERT: Adaptive Tokenization for Efficient RNA Language Modeling**, Accepted at NeurIPS 2024 (Spotlight Paper), Under Revision: Nature Communications Biology.
- **TransBind: Enhancing Precise Detection of DNA-Binding Proteins and DNA-Protein Binding Residues**, Accepted in Nature Communications Biology.
- **EmbedSimScore: Advancing Protein Similarity Analysis with Structural and Contextual Embeddings**, Accepted at NeurIPS 2024, Self-Supervised Learning Workshop.
- **BioLLMNet: Enhancing RNA-Interaction Prediction with a Specialized Cross-LLM Transformation Network**, Under Review: Briefings in Bioinformatics.

2. Remote Research Intern

Computational Connectomics Lab,

MIT

SUPERVISORS: NIR SHAVIT AND LU MI

Jul. 2023 - Dec. 2024

• Responsibilities and Experience

- Designed unified representations for artificial and biological neural networks using graph-based approaches.
- Investigated correlations between network structure and function in both artificial neural networks and biological connectomes.
- Contributed to understanding Alzheimer's Disease by linking connectomic variations with biomarkers.

• Publications

- **Structure Matters: Deciphering Neural Network's Properties from its Structure**, Accepted at NeurIPS 2024, Symmetry and Geometry in Neural Representations.

3. Remote Research Intern

XuLab, Carnegie Mellon University

SUPERVISOR: MIN XU

Jan. 2024 - Dec. 2024

• Responsibilities and Experience

- Developed positive-unlabeled learning methods for particle selection in cellular cryo-ET datasets.
- Designed algorithms for converting 2D bounding boxes into 3D bounding volumes for tomogram analysis.
- Conducted subtomogram averaging and benchmarking of state-of-the-art methods for detection tasks.

• Publications

- **TomoPicker: Annotation-Efficient Particle Picking in Cellular Cryo-Electron Tomograms**, Accepted at NeurIPS 2024, Machine Learning for Structural Biology Workshop.

4. Machine Learning Engineer and Research Assistant

Samsung Research and
Development, Bangladesh

SUPERVISOR: DR. ANINDYA IQBAL

Jan. 2024 - Dec. 2024

- **Responsibilities and Experience**

- Designing and fine-tuning large language models (LLMs) capable of generating test cases from Android applications.
- Applying multi-modal large language models to automate the execution of user instructions, enhancing software testing processes.

5. Undergraduate Research Assistant

Structural and Functional Genomics
Research Group, CSE, BUET

SUPERVISOR: M. SAIFUR RAHMAN

Jul. 2023 - Dec. 2024

- **Responsibilities and Experience**

- Applied large language models for RNA sequence prediction and structural analysis.
- Developed computationally efficient algorithms for biomolecular structural prediction within error bounds.
- Utilized graph representation learning for enhanced molecular biology applications.

- **Publications**

- **LOCAS: Multi-label mRNA Localization with Supervised Contrastive Learning**, Accepted at NeurIPS 2024 MLSB Workshop.
- **DeepRNA-Twist: Language Model Guided RNA Torsion Angle Prediction with Attention-Inception Network**, Under Review.
- **GraFusionNet: Integrating Node, Edge, and Semantic Features for Enhanced Graph Representations**, Under Review.

6. Undergraduate Research Assistant

Next Generation Computing (NEC)
Research Lab, CSE, BUET

SUPERVISOR: A.B.M. ALIM AL ISLAM

Jan. 2022 - Jul. 2024

- **Responsibilities and Experience**

- Developed machine learning and simulation models to solve real-world challenges in third-world contexts.
- Analyzed human-computer interaction (HCI) and brain-computer interface (BCI) methods for innovative problem-solving.

- **Publications**

- **A Ubiquitous Method for Predicting Underground Petroleum Deposits Based on Satellite Data**, Published in Nature Scientific Reports.
- **Escalating Post-Disaster Rescue Missions Through Ad-Hoc Victim Localization Exploiting Wi-Fi Networks**, Published in Heliyon.
- **Long-Range Low-Cost Networking for Real-Time Monitoring of Rail Tracks in Developing Countries**, Published in ICTD 2022 Proceedings.

Teaching

Department of Computer Science and Engineering, Bangladesh University of Engineering and Technology (BUET)

Bangladesh

ADJUNCT LECTURER

August 2024 - Present

- **Introduction to Machine Learning (CSE 472)**: Delivered lectures on fundamental theories, conducted lab sessions, designed assignments, and supervised student projects focusing on molecular and functional biology as well as healthcare applications.
- **Introduction to Data Structures and Algorithms (CSE 106)**: Conducted lab sessions and designed assignments to reinforce core algorithmic concepts.
- **Introduction to Signal Processing (CSE 220)**: Taught theoretical concepts and designed assignments focused on biomedical signal analysis, including topics such as FFT and DFT.

Awards

1. HPC Immersion Program

Denver, Colorado

ACM SIGHPC GRANT RECIPIENT AND ATTENDEE, SC23

Nov 10-20, 2023

Selected to join the HPC Immersion Program at SC23 among **15 other students worldwide**. Awarded a travel grant of **4,000 USD** as a representative of underrepresented communities in high-performance computing.

2. Winner of Honda Y-E-S Award

Bangladesh

HONDA Y-E-S (YOUNG ENGINEER AND SCIENTIST) AWARD

2024

Recognized as one of **four young researchers from Bangladesh** for outstanding contributions to research and development.

Awarded a grant of **3,000 USD** and an additional **10,000 USD** for higher education in Japan.

3. RISE Research Grants (BUET)

Bangladesh

RESEARCH INITIATIVES FOR SCIENCE AND ENGINEERING (RISE)

2022-2024

Awarded **three grants of 1,000 USD each** for contributions in:

- Computational Health and Biology (2024), published in *Nature Communications Biology*.
- Machine Learning for Health Informatics (2023), published in *IEEE Journal of Biomedical and Health Informatics*.
- Machine Learning for Scientific Discovery (2022), published in *Nature Scientific Reports*.

4. Spotlight Award

NeurIPS 2024

NEURIPS 2024 ENLSP WORKSHOP

2024

Received the **Spotlight Award** for undergraduate thesis work titled *BiRNA-BERT Allows Efficient RNA Language Modeling with Adaptive Tokenization*.

5. Academic Excellence

Bangladesh University of
Engineering and Technology (BUET)

UNIVERSITY DEAN'S SCHOLARSHIP AND DEPARTMENTAL MERIT SCHOLARSHIP

2020-2024

Awarded the **University Dean's Scholarship** for maintaining a CGPA over 3.75 for **four consecutive years**. Received the **Departmental Merit Scholarship seven times** for being among the top students in the CSE department.

6. Best Student Poster Awards

Bangladesh

NSYSS 2021 AND 2023

2021, 2023

Received the **Best Student Poster Award** for:

- "Is It Really Dead?" (2021) - Analysis of neural behavior in response to external stimuli.
- *BD-Vent: A Low-Cost Automated Mechanical Ventilator* (2023).

7. Honorable Mention Award

Dhaka, Bangladesh

NOTRE DAME COLLEGE

2018

Achieved **3rd place out of 2,000 students** for academic and extracurricular excellence during high school.

References

Md. Shamsuzzoha Bayzid

PROFESSOR; DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING, BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

Email: shams_bayzid@cse.buet.ac.bd

Dr. Min Xu

ASSOCIATE PROFESSOR; SCHOOL OF COMPUTER SCIENCE, CARNEGIE MELLON UNIVERSITY

Email: mxu1@cs.cmu.edu

Dr. Lu mi

ASSISTANT PROFESSOR; SCHOOL OF COMPUTATIONAL SCIENCE AND ENGINEERING, GEORGIA INSTITUTE OF TECHNOLOGY

Email: lmi7@gatech.edu