Md. Jubayer Hossain

Single-Cell Genomics, Cancer Genomics, Neurogenomics and AI in Biology
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Research Statement

My research focuses on developing reproducible bioinformatics pipelines for large-scale bulk and single-cell RNA-seq data to uncover molecular biomarkers, immunological signatures, and therapeutic targets in cancer and neurological diseases. By integrating multi-omics data analysis, machine learning, and biology, I aim to advance computational methods that bridge biological discovery and clinical translation.

Education and Training

Master of Science in Microbiology
Dhaka, Bangladesh

Jagannath University
2019—2020

- Relevant Coursework: Genomics, Proteomics, Bioinformatics, Research Methodology and Scientific Writing

Bachelor of Science in Microbiology
Dhaka, Bangladesh

Jagannath University
2016—2019

- Relevant Coursework: Biostatistics, Public Health and Hygiene, Bioinformatics I, Bioinformatics II

Specialized Training: AI in Public Health
Dhaka, Bangladesh

Child Health Research Foundation (CHRF)
2023

- Acquired Skills: Epidemiological Modeling, Disease Surveillance using AI, Time Series Analysis (LSTM, ARIMA), Medical Image Analysis (X-ray, MRI)

Research Experience

Visiting Researcher
Dhaka, Bangladesh

Department of Public Health, Daffodil International University (Part-time)
Sep 2025 – Present

- Collaborated with DIU faculty and students on ongoing research projects, grant proposals, and publications in public health and health informatics, resulting in 2 manuscripts under preparation.
- Delivering workshops, online courses, and research mentorship to strengthen capacity building in public health research.

Nextflow Ambassador
Global

Nextflow Community (Voluntary)
2024 – Present

- Promoted adoption of Nextflow workflows within the computational biology and health data science communities through technical advocacy, tutorials, and peer support.
- Organized and contributed to community-driven events, workshops, and knowledge-sharing sessions focused on reproducible, scalable, and portable scientific workflows.
- Provided hands-on guidance to researchers and early-career scientists on workflow design, best practices, and troubleshooting in Nextflow-based pipelines.
- Strengthened the global Nextflow ecosystem by fostering collaboration between users, developers, and research groups, supporting the advancement of reproducible data analysis in life sciences.

GBD Collaborator
Washington, USA

Institute for Health Metrics and Evaluation (Part-time, Voluntary)
Jan 2024 – Present

- Contributed critical analytical feedback and statistical modeling to 4 Global Burden of Disease (GBD) studies, including one on routine childhood vaccination coverage published in The Lancet.
- Supported manuscript development and provided methodological input for 3 ongoing high-impact GBD papers (breast cancer, headache disorders, and mental disorders), all currently under peer review.

- Enhanced epidemiological insights by integrating and validating datasets from 190+ countries, improving the robustness of global health policy evidence.

Research Intern
Dhaka, Bangladesh

International Center for Diarrhoeal Disease Research, Bangladesh (Part-time, Voluntary) *Feb 2022—Jun 2022*

- Designed and implemented a comprehensive search strategy across PubMed, Embase, and PsycINFO, screening 8,000+ articles to support a systematic review on intimate partner violence in South Asia.
- Streamlined the abstract screening process in Covidence, identifying 400+ potentially relevant studies.
- Conducted full-text screening of 120+ articles and extracted key variables for meta-analysis.
- Drafted a systematic review protocol based on PRISMA guidelines, ensuring methodological transparency and reproducibility.

Data Enumerator
Australia

School of Allied Health, Curtin University (Part-time) *Oct 2022—Nov 2022*

- Collected both quantitative and qualitative data from 40 Bangladeshi doctors for a Delphi study on Patient Outcomes Measurement in Interprofessional Tuberculosis Care.
- Validated and cleaned all survey responses, achieving 100% accuracy in the final dataset.
- Enhanced the reliability of study outcomes by ensuring high-quality and complete data capture.

Team Member
Australia

Bio-Bio-1: Bioinformatics Research Discussion Group (Part-time, Voluntary) *Jan 2017—Dec 2019*

- Engaged in collaborative research discussions and pursued continuous learning opportunities in bioinformatics.
- Contributed to the design of training modules and preparation of learning content to support group activities.
- Took initiative in team projects and developed leadership skills through active participation.

Publications

*Note: * indicates corresponding author*

1. Fariha, F. T. J., Fuad, M., Saha, C. S., Hossen, S., & **Hossain, M. J.*** (2025). Comprehensive bioinformatics analysis reveals prognostic significance and immunological roles of WNT gene family in breast cancer. Sci Rep 15, 34490 (2025). https://doi.org/10.1038/s41598-025-13315-6
2. Ahmed, M. Z., Billah, M. M., Ferdous, J., & **Hossain, M. J.*** (2025). Pan-cancer analysis reveals immunological and prognostic significance of CCT5 in human tumors. *Scientific Reports, 15*, 14405. https://doi.org/10.1038/s41598-025-88339-z
3. Bari, S.M., Fuad, M., **Hossain, M.J.** et al. A meta-analysis of public RNA-Seq data identifies conserved stress responses in rainbow trout. BMC Genomics 26, 999 (2025). https://doi.org/10.1186/s12864-025-12127-2
4. Shanta, A. S., Islam, N., Al Asad, M., Akter, K., Habib, M. B., **Hossain, M. J.**, Nahar, S., Godman, B., & Islam, S. (2024). Resistance and co-resistance of metallo-beta-lactamase genes in diarrheal and urinary-tract pathogens in Bangladesh. *Microorganisms, 12*(8), 1589. https://doi.org/10.3390/microorganisms12081589
5. GBD 2023 Vaccine Coverage Collaborators (**Hossain, M. J.**, 2025). Global, regional, and national trends in routine childhood vaccination coverage from 1980 to 2023 with forecasts to 2030: A systematic analysis for the Global Burden of Disease Study 2023. *The Lancet*. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(25)01037-2/
6. GBD 2023 Headache Collaborators (**Hossain, M. J.**, 2025). Global, regional, and national burden of headache disorders, 1990–2023: a systematic analysis for the Global Burden of Disease Study 2023. *Lancet Neurology*. https://www.thelancet.com/journals/laneur/article/PIIS1474-4422(25)00402-8/fulltext
7. **Hossain, M. J.***, Das, M., Shahjahan, M., Islam, M. W., & Towhid, S. T. (2025). Clinical and hematological manifestation of dengue patients in 2022 outbreak: A tertiary care hospital-based cross-sectional study. *Health Science Reports, 8*, e70356. https://doi.org/10.1002/hsr2.70356
8. Das, M., & **Hossain, M. J.*** (2025). Young stroke in Bangladesh: Addressing rare cases with diagnostic challenges and much-needed solutions. *Stroke and Vascular Neurology*. https://svn.bmj.com/content/early/2025/04/07/svn-2025-004178

9. **Hossain, M. J.***, Sony, S. A., Fariha, F. T. J., & Hossen, S. (2025). Preventing the silent threat: A perspective on preparing Bangladesh for Human Metapneumovirus (HMPV). *Health Science Reports, 8*, e71101. https://doi.org/10.1002/hsr2.71101

10. **Hossain, M. J.***, Das, M., & Munni, U. R. (2024). Urgent call for compulsory premarital screening: A crucial step towards thalassemia prevention in Bangladesh. *Orphanet Journal of Rare Diseases, 19*, 326. https://doi.org/10.1186/s13023-024-03344-1

11. Islam, M. W., Shahjahan, M., Azad, A. K., & **Hossain, M. J.*** (2024). Factors contributing to antibiotic misuse among parents of school-going children in Dhaka City, Bangladesh. *Scientific Reports, 14*, 2318. https://doi.org/10.1038/s41598-024-52313-y

12. **Hossain, M. J.***, Das, M., Islam, M. W., Shahjahan, M., & Ferdous, J. (2024). Community engagement and social participation in dengue prevention: A cross-sectional study in Dhaka City. *Health Science Reports, 7*, e2022. https://doi.org/10.1002/hsr2.2022

13. **Hossain, M. J.***, Azad, A. K., Shahid, M. S. B., Shahjahan, M., & Ferdous, J. (2024). Prevalence, antibiotic resistance pattern for bacteriuria from patients with urinary tract infections. *Health Science Reports, 7*, e2039. https://doi.org/10.1002/hsr2.2039

14. Akter, M. M., & **Hossain, M. J.*** (2024). Food consumption patterns and sedentary behaviors among the university students: A cross-sectional study. *Health Science Reports, 7*, e70259. https://doi.org/10.1002/hsr2.70259

15. **Hossain, M. J.***, Islam, M. W., Munni, U. R., Gulshan, R., Mukta, S. A., Miah, M. S., Sultana, S., Karmakar, M., Ferdous, J., & Islam, M. A. (2023). Health-related quality of life among thalassemia patients in Bangladesh using the SF-36 questionnaire. *Scientific Reports, 13*(1). https://doi.org/10.1038/s41598-023-34205-9

16. Towhid, S.T., **Hossain, M. J.**, Sammo, M.A.S., & Akter, S.Perception of Students on Antibiotic Resistance and Prevention: An Online, Community-Based Case Study from Dhaka, Bangladesh. European Journal of Biology and Biotechnology, https://doi.org/10.24018/ejbio.2022.3.3.341

17. **Hossain, M. J.**, Towhid, S.T., Sultana, S., Mukta, S.A., Gulshan, R., Miah, M.S. Knowledge and Attitudes towards Thalassemia among Public University Students in Bangladesh. Microbial Bioactives, 5(2). https://doi.org/10.25163/microbbioacts.526325

Under Review

1. Islam, M. W., Rahman, M. M., Naznin, H., Hossain, M. S., Akter, T., Shatabde, Z. A., & **Hossain, M. J.*** (2025). Integrative bioinformatics analysis reveals COL13A1 and COL23A1 as potential diagnostic and prognostic biomarkers in thyroid cancer. [Submitted to Health Science Reports].

2. Islam, M. W., Fariha, F. T. J., Ahmed, M. Z., Ferdous, J., Lota, H. B., Hossain, M. S., Kundu, P., Shahjahan, M., & **Hossain, M. J.*** (2025). Bioinformatics-driven multi-omics profiling of CDK1 and CDK6 identifies prognostic and therapeutic roles in breast cancer.[Under Review in Health Science Reports].

3. Billah, M. M., Mabsurah, K., Ahammad, K., Yeana, I. J., Sumaiya, M., Islam, T., Bhattacharjee, A., Ferdous, J., & **Hossain, M. J.*** (2025). Multi-omics pan-cancer analysis reveals an immunological role and prognostic potential of WDR76. [Under Review in Discover Oncology].

4. Sony, S. A., Kundu, L. R., Limon, M. H., Chowdhury, T. B. K., & & **Hossain, M. J.*** (2025). Predicting early antenatal care initiation at the first trimester among reproductive women in Bangladesh using machine learning. [Under Review in BMC Pregnancy and Childbirth].

5. **Hossain, M. J.***, Shahariar, M., Barsha, LHJ. Shahjahan, M., Towhid, ST., Sheikh, MK., Hasan, MM., Rahman, MH., Sazid, MS. (2024). Lack of knowledge and training about antibiotic resistance among community pharmacists in Bangladesh: a cross-sectional study. [Under Review in Health Science Reports].

Working Papers

1. **Fezf2-Mediated Cortical Development: Multi-Omics Analysis**. Integrative analysis of bulk and single-cell RNA-Seq data to elucidate Fezf2's role in cortical neurogenesis. *Tech:* Python, Seurat, Scanpy, DESeq2 *GitHub:* https://github.com/hossainlab/fezf2-multiomics

2. **Single-Cell Meta-Analysis of Microglial Activation in Alzheimer's Disease**. Meta-analysis of single-cell RNA-Seq datasets to identify microglial states and activation patterns in Alzheimer's disease. *Tech:* Python, Scanpy, R/Seurat, Harmony, scVI-tools *GitHub:* https://github.com/hossainlab/alzheimers-microglia-meta-analysis
3. **Integrative Spatial-scRNA-seq Atlas of Immunotherapy Resistance Mechanisms Across Cancer Types**. Comprehensive spatial transcriptomics and single-cell analysis to map tumor microenvironment and resistance mechanisms in immunotherapy. *Tech:* Python, Scanpy, Seurat, Squidpy, SpatialData, scVI-tools *GitHub:* https://github.com/hossainlab/spatial-scRNA-immune-resistance

Conferences

*Note: ⁺Indicates a presenter, ‡indicates a co-author, and * indicates a corresponding author*

Poster Presentations

1. ⁺Hossain, M. J., Das, M. (2024). Diagnostic and Electrophysiological Features of Hirayama Disease in Young Adult Male: A Case Report. International Conference of Public Health, Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh
2. ⁺Das, M., Kajol, M. M., Mim, N. A., Maruf, M. F. I., Hirko, K., *__Hossain, M. J.__ (2024). Level of knowledge regarding breast cancer and breast self-examination among school and college-going girls in Bangladesh: A cross-sectional study. International Conference of Public Health, Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh
3. Shahariar, M., Joarder Barsha, L. H., ⁺Shahjahan, M., Towhid, S. T., Sheikh, M. K., Hasan, M. M., Rahaman, M. H., Sazid, M. S., *__Hossain, M. J.__ (2024). Lack of knowledge and training about antibiotic resistance among community pharmacists in Bangladesh: A cross-sectional study. International Conference of Public Health, Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh
4. ⁺Afrin, N., Howlader, G., Bhattacharjee, A., Akter, N., Mesu, M. H., Mazumder, E., *__Hossain, M. J.__ (2024). Influence of Meteorological Factors on Dengue Incidence: A 23-Year Retrospective Analysis in Bangladesh. International Conference of Public Health, Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh
5. ⁺Akter, N., Mim, N. A., *__Hossain, M. J.__ (2024). Particulate Matter PM2.5 Pollution and Air Quality Index (AQI) Trends Evaluation with Meteorological Factors in Dhaka City. International Conference of Public Health, Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh

Oral Presentations

1. ⁺Tuhin, M. A. A., Mim, N. A., Akter, N., Jamal, F., Sakib, M. N., Mehjabin, K., *__Hossain, M. J.__ (2024). Exploring the Factors Influencing Heat Stress Risks Using the Discomfort Index Method in Bangladesh. International Conference on Environmental Science and Resource Management 2024 (ICESRM 2024), Department of Environmental Science and Resource Management, Mawlana Bhashani Science and Technology University, Bangladesh.
2. Mim, N. A., Akter, Tuhin, M. A. A., ⁺Hossain, S., Alam, K. E., Mouli, N. J., *__Hossain, M. J.__ (2024). Temporal Trends and Factors Influencing Diarrhea Prevalence Among Children in the Rangamati Hill Tract Region: A Time Series Analysis. International Conference on Environmental Science and Resource Management 2024 (ICESRM 2024), Department of Environmental Science and Resource Management, Mawlana Bhashani Science and Technology University, Bangladesh.
3. Nayeem, M. U., Mrittika, M. A., ‡__Hossain, M. J.__, Azad, A. K., Ferdous, J., Ahmed, S., Sanyal, S. K., Towhid, S. T. (2023). Quantitative Microbial Risk Assessment from Vancomycin-Resistant Enterococcus faecalis and Enterococcus faecium from a Specific Neighborhood in Dhaka City, Bangladesh. 36th Bangladesh Society of Microbiologists Annual Conference, Shahjalal University of Science and Technology (SUST), Sylhet, Bangladesh, January 2023.
4. ‡__Hossain, M. J.__, ⁺Habiba, U., Rozario, C., Tuhin, M. L. A., Mabsurah, K., Uddin, N. F. (2023). Factors influencing heat stress risk in Bangladesh. 9th International Public Health Conference by Public Health Foundation at Bangladesh Medical Research Council (BMRC), Bangladesh, November 2023.
5. ‡__Hossain, M. J.__, ⁺Nowshin, N., Momtaj, Yeana, I. Y., Nohor, N. (2023). Monitoring Water-Borne Disease (Vibrio cholerae) using NASA Earth observation data. 9th International Public Health Conference by Public Health Foundation at Bangladesh Medical Research Council (BMRC), Bangladesh, November 2023.

Technical Skills

- **Programming Languages**: Python, R, Julia, SQL, Bash, JavaScript
- **Data Science**: PyTorch, TensorFlow, scikit-learn, XGBoost, PyCaret
- **Bulk RNA-Seq Analysis**: FastQC, MultiQC, Cutadapt, STAR, HISAT2, Salmon, Kallisto, DESeq2, clusterProfiler
- **Single-Cell RNA-Seq Analysis**: Seurat, scverse ecosystem (Scanpy, scVI-tools, scVelo, squidpy), CellRanger, Harmony, SingleR, celldex, velocyto
- **Computational Biology & Cheminformatics**: BioPython, BioPandas, Scikit-bio, RDKit, DeepChem, PyMOL
- **Microbiome Analysis**: QIIME2, DADA2, Phyloseq, PICRUSt2
- **Workflow Management & Reproducibility**: Nextflow, Snakemake, Docker, Git, GitHub
- **Data Visualization & Reporting**: ggplot2, Seaborn, Matplotlib, Plotly, Quarto, Jupyter
- **Computing Environments**: UNIX/Linux, HPC clusters, Cloud computing (AWS, Google Cloud)

Teaching Experience

Faculty

Dhaka, Bangladesh

cBLAST, University of Dhaka (Part-time) *Aug 2023 - Present*

- Designed and delivered specialized courses in Biomedical Machine Learning with Python (20 trainees), Data Science and Machine Learning for Biologists (100+ enrolled), and School of Bioinformatics (15 trainees).
- Supervised student research projects applying ML frameworks to biomedical datasets, guiding participants toward publication-ready outputs and conference presentations.
- Website-https://cblast.du.ac.bd/

Instructor

Dhaka, Bangladesh

Micro-Credentials Academy, Daffodil International University (Part-time) *July 2025 - Present*

- Designed and delivered modules on AI for disease modeling, digital health, and biomedical informatics
- Coordinated training programs that reached diverse student groups, bridging computing and health sciences
- Website-https://mdjubayerhossain.com/ai4ph/

Lead Organizer & Instructor

Dhaka, Bangladesh

Professional Training in Bioinformatics and Computational Biology (Part-time) *Jan 2025 - Present*

- Developed a year-long, university-style program covering genomics, transcriptomics, single-cell RNA-seq, and AI in health, with 40 students enrolled from Bangladesh, Pakistan, India, and African countries.
- Led a team of 4 instructors and 8 teaching assistants and created real-world case study curricula, preparing students for professional research careers in bioinformatics and computational biology.
- Website-https://academy.deepbioltd.com/

Program Lead

Dhaka, Bangladesh

GSA Bioinformatics Internship (Part-time) *June 2025 - Present*

- Designed and taught a hands-on bioinformatics curriculum (Bash, R, RNA-seq, scRNA-seq) for interns annually.
- Mentored 5 research interns on an original project: Comparative pan-cancer transcriptomics meta-analysis, which uncovered shared and distinct transcriptional networks with pathway crosstalk in liver, kidney, pancreas, and gastrointestinal cancers for biomarker and therapeutic target discovery.
- Guided interns in RNA-seq meta-analysis, coding, and scientific communication, leading to conference abstracts and manuscript preparation.
- Website-https://gsabioinfointernship.owlstown.net/

Teaching Assistant

Dhaka, Bangladesh

Department of Microbiology, Jagannath University (Part-time) *Oct 2022 - Dec 2022*

- Assisted in preparing and delivering lectures, course materials, and assessments for 40 undergraduate students in Public Health & Hygiene.
- Mentored students on a public health project, providing guidance on research design, data analysis, and presentation skills.
- Supported faculty in student evaluation and academic advising, fostering stronger student engagement with departmental activities.
- Website-https://jnu.ac.bd/department/portal/microbiology

Courses Taught

1. **Biomedical Machine Learning with Python**. Applied machine learning frameworks for biomedical data analysis and predictive modeling. *Institution:* cBLAST, University of Dhaka
2. **Data Science and Machine Learning for Biologists**. Comprehensive training in data science workflows and ML applications for biological research. *Institution:* cBLAST, University of Dhaka
3. **AI for Public Health**. Modules on AI applications in disease modeling, digital health, and biomedical informatics. *Institution:* Micro-Credentials Academy, Daffodil International University
4. **Transcriptomics Data Analysis (Bulk + Single-Cell Analysis)**. Comprehensive training in bulk and single-cell RNA-seq data analysis workflows and interpretation. *Institution:* DeepBio Limited
5. **Biomarker Identification using Machine Learning**. Machine learning approaches for discovering and validating biomarkers from omics datasets. *Institution:* DeepBio Limited
6. **Pan-Cancer Bioinformatics with R: Ideation to Publication**. End-to-end research workflow from hypothesis generation to publication using R and bioinformatics tools. *Institution:* DeepBio Limited
7. **AI in Drug Discovery: In Silico Toxicology Modeling**. Computational approaches for drug discovery and predictive toxicology modeling using AI. *Institution:* DeepBio Limited
8. **Single-Cell Cancer Genomics**. Advanced methods for analyzing single-cell genomic data in cancer research contexts. *Institution:* DeepBio Limited
9. **Bioinformatics and Integrative Genomics (BIG)**. Integration of cancer genomics, neurogenomics, computer-aided drug design and AI for life sciences in bioinformatics research applications. *Institution:* DeepBio Limited
10. **BRAIN – Bioinformatics Research with AI in Neurosciences**. Specialized course on applying AI and bioinformatics methods to neuroscience research. *Institution:* DeepBio Limited

Research Mentoring

Bulk RNA-Seq Meta-Analysis of Liver, Kidney, Pancreatic, and Gastrointestinal Cancers for Biomarker and Immune Signature Discovery (July 2025 - present)

- **Rahnuma Tabassum** (Biochemistry & Molecular Biology, Jagannath University) - Liver Cancer
- **Fayez Ahmad** (Notre Dame College) - Esophageal Cancer
- **Sabbir Khan** (Doctor of Veterinary Medicine, Gazipur Agricultural University) - Kidney Cancer
- **Md Shakil Ahamed** (Biotechnology & Genetic Engineering, Mawlana Bhashani Science & Technology University) - Colon Cancer
- **Lamisa Manha Aditee** (Biotechnology, BRAC University) - Pancreatic Cancer

Leadership Experience

Founder & Chief Executive Officer

Dhaka, Bangladesh

DeepBio Limited (Self-employed)

Jan 2025 - Present

- Founded and lead a bioinformatics company specializing in cancer genomics, transcriptomics, and AI-driven healthcare solutions.
- Recruited and manage a multidisciplinary team of 13 scientists (4 CADD Scientists I, 5 Bioinformatics Scientists I, 4 Computational Biologists) to drive computational biology and bioinformatics research.
- Developed and implemented scalable bulk RNA-seq and single-cell analysis pipelines, enabling translational medicine and biomarker discovery for cancer and neurodegenerative diseases.
- Launched a professional training program in bioinformatics and computational biology, training 40 students across Bangladesh, Pakistan, India, and African countries to strengthen the regional talent pipeline.
- Established collaborations with academic and industry partners to expand computational biology research capacity in South Asia.
- Website-https://deepbioltd.com/

Founder & Executive Director *Dhaka, Bangladesh*

Center for Health Innovation, Research, Action, and Learning - Bangladesh (Self-employed) *June 2020 - Present*

- Founded and expanded a non-profit research institute empowering young scientists in public health, bioinformatics, geospatial health, and AI for health, now structured into 4 research divisions.
- Trained over 3,000 undergraduate students nationwide on the fundamentals of research methods, data science, and scientific writing.
- Published 20+ peer-reviewed articles in international journals (Q1, Q2) and presented 40+ conference papers, advancing knowledge in public health, bioinformatics, and health informatics.
- Guided the preparation of 15+ manuscripts currently under peer review, strengthening the pipeline of early-career researcher contributions.
- Secured collaborative partnerships with Thalassemia Foundation Bangladesh, One Health Lab, Jahangirnagar University and Sher-e-Bangla Agricultural University, and Michigan State University to foster capacity building in biomedical research across Bangladesh.
- Website-https://chiralbd.org/

Bioinformatics Workflows

1. **Bulk RNA-Seq Meta-Analysis Pipeline**. Nextflow-based pipeline for meta-analysis of public RNA-Seq data with automated QC and differential expression. *Tech:* Nextflow, nf-core, Python, R/Bioconductor, Docker *GitHub:* https://github.com/hossainlab/nf-core-rnaseqmeta
2. **Single-Cell Meta-Analysis Pipeline**. Pipeline for single-cell RNA-Seq integration, cell type annotation, and batch correction. *Tech:* Python, Scanpy, R/Seurat, Harmony, scVI-tools *GitHub:* https://github.com/hossainlab/sc-meta-analysis-pipeline
3. **Salmon RNA-Seq Quantification Pipeline**. End-to-end pipeline for ultra-fast transcript quantification and quality assessment. *Tech:* Salmon, FastQC, MultiQC, R/Bioconductor *GitHub:* https://github.com/hossainlab/salmon-rnaseq
4. **Biomarker Identification using Machine Learning**. ML framework for biomarker discovery with feature selection and model interpretability. *Tech:* Python, Scikit-learn, XGBoost, SHAP *GitHub:* https://github.com/hossainlab/biomarker_identification
5. **GEO Differential Expression & ML Dataset Prep**. Automated GEO data retrieval, differential expression analysis, and ML dataset generation. *Tech:* R/Bioconductor, Python, GEOquery, limma, DESeq2 *GitHub:* https://github.com/bigbiolab/geo_ml
6. **16S rRNA Microbiome Analysis Pipeline**. Comprehensive microbiome pipeline combining QIIME 2 and DADA2 for taxonomic profiling. *Tech:* QIIME 2, R/DADA2, Phyloseq, VSEARCH *GitHub:* https://github.com/hossainlab/16S-pipeline

GenAI Projects

1. **DeepTrust AI (Prototype)**. AI-powered tool to detect and counter health misinformation with NLP and credibility scoring features. *Tech:* Python, NLP, Transformers, FastAPI, Streamlit *Demo:* https://deeptrustai.deepbioltd.com
2. **GenMed AI (Prototype)**. AI-driven platform accelerating drug discovery through disease data analysis, protein target identification, and therapeutic compound generation. *Tech:* Python, BioPython, RDKit, DeepChem, Transformers, PyTorch *Demo:* https://genmedai.deepbioltd.com

Invited Talks

1. **Computational Biology and Bioinformatics Research in Resource-Limited Settings: Strategies, Tools and Opportunities** (2025). Speaker, Jagannath University Higher Study and Research Society. In this talk, I delivered the strategies and techniques essential for mastering computational biology and bioinformatics research.

2. **Mastering Biomedical Data Management** (2024). Speaker, IFMSA Bangladesh, Dhaka, Bangladesh. In the era of big data and advanced technologies, the management of biomedical data presents both immense opportunities and significant challenges. In this talk, I explored the strategies and techniques essential for mastering biomedical data management.
3. **Undergraduate Research - Importance, Benefits, and Challenges** (2022). Speaker, CHIRAL Bangladesh, Dhaka, Bangladesh. This talk was designed to enhance the undergraduate research experience by focusing on critical communication skills for success in research and broad transferable professional skills.
4. **State the Art of Microbial Genome Analysis** (2022). Speaker, Jagannath University, Dhaka, Bangladesh. This talk was about the art of genomic data analysis. I explored genomic data analysis steps typically include data collection, quality check and cleaning, processing, modeling, visualization and reporting.

Media Coverage

1. **"Parental lack of antibiotic knowledge imperils child health in Bangladesh: Study"**. The Business Standard (TBS), 2024. Featured research on antibiotic misuse among 63% of parents in Dhaka.
2. **"What the rise in self-medication tells us about the country's healthcare system"**. The Business Standard (TBS), 2024. Expert commentary on self-medication practices and healthcare system gaps.

References

Dr. Syeda Tasneem Towhid
Associate Professor
Department of Microbiology
Jagannath University
Email: towhidst@mib.jnu.ac.bd

Dr. Md. Salequl Islam
Professor
Department of Microbiology
Jahangirnagar University
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Dr. Zeba Islam Seraj
UGC Professor
Department of Molecular Biology and Biochemistry
University of Dhaka
Director, cBLAST
Email: zebai@du.ac.bd