

ABDUL MUNTAKIM RAFI

LinkedIn: 

Google Scholar: 

GitHub: 

ORCID: 

CURRENT RESEARCH INTEREST

Decoding cis-regulatory logic using machine learning: building sequence-to-expression models, developing methods to interpret and rigorously evaluate their reliability, and continually improving these models through large-scale synthesis of informative DNA sequences and lab-in-the-loop experiments.

EDUCATION

DOCTOR OF PHILOSOPHY IN BIOMEDICAL ENGINEERING University of British Columbia SUPERVISOR: Carl de Boer, Assistant Professor, School of Biomedical Engineering CUMULATIVE AVERAGE: 88.7/100	2021-PRESENT Vancouver, Canada
MASTER OF APPLIED SCIENCE IN ELECTRICAL ENGINEERING University of Windsor SUPERVISOR: Jonathan Wu, Professor, Department of Electrical and Computer Engineering CUMULATIVE AVERAGE: 91.75/100	2019-2021 Windsor, Canada
BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONIC ENGINEERING (EEE) Bangladesh University of Engineering and Technology (BUET) SUPERVISOR: Md. Kamrul Hasan, Professor, Department of EEE CGPA: 3.47/4.00	2014-2018 Dhaka, Bangladesh

RESEARCH EXPERIENCE

- **Graduate Research Assistant, de Boer Lab** [\[website\]](#) May 2021-present
School of Biomedical Engineering, University of British Columbia, Vancouver, Canada
- **Graduate Research Assistant, Centre for Computer Vision and Deep Learning** [\[website\]](#) Aug 2019-Mar 2021
Department of Electrical and Computer Engineering, University of Windsor, Windsor, Canada
- **Research Assistant, Digital Signal Processing Research Laboratory** Oct 2018-Mar 2019
Department of Electrical and Electronic Engineering, BUET, Dhaka, Bangladesh.

WORK EXPERIENCE

- **Intern-Human Genetics, Genentech Inc.** Jun-Aug 2025
Developed reliability estimation methods for sequence-to-expression model predictions.
- **Graduate Teaching Assistant, Master of Data Science, UBC** Sep 2021-Dec 2024
Courses: Supervised Learning I & II, Regression II, Statistical Inference and Computation II, Experimentation and Causal Inference, Feature and Model Selection, Algorithms and Data Structures, Data Visualization I, Data Science Workflows, Web and Cloud Computing, Computing Platforms for Data Science.
- **Graduate Teaching Assistant, Biology Program, UBC** May-Jun 2022
Course: Fundamentals of Genetics.
- **Mitacs Accelerate Intern, Lanner Electronics Inc.** Nov 2020-Mar 2021
Benchmarked efficient inference of AI-driven applications on edge devices.
- **Graduate Teaching Assistant, ECE Department, University of Windsor** Jan-Dec 2020
Courses: Engineering Software Fundamentals, Computational Intelligence.
- **Mitacs Accelerate Intern, IFIVEO** Oct 2019-Apr 2020
Developed vision-based deep learning models for activity recognition on manufacturing floors.
- **Machine Learning Engineer, REVE Systems Ltd.** Mar-Jul 2019
Designed a real-time Sign2Text translator for Bangla Sign Language.

PUBLICATIONS

*Equal contribution. †Corresponding author.

Preprints/In Preparation

- **Abdul Muntakim Rafi**[†], Gökçen Eraslan, Kipper Fletez-Brant[†], “gRely: Reliability estimation of variant effect predictions for genome trained sequence-to-expression models”, *in preparation*, 2026.

- Justin Qian*, **Abdul Muntakim Rafi***[†], Emmanuel Cazottes*, Carl de Boer[†], “Evaluation of active learning selection strategies and characterization of informative sequences for sequence-to-expression models”, *in preparation*, 2026.
- Timon Schneider, **Abdul Muntakim Rafi**, Cassandra Jensen, Daniella Liao, Yiren Zhao, Carl de Boer, Tom Ellis, “Yorzoi: Predicting RNA-seq coverage from DNA sequence in yeast”, preprint 2025. [*bioRxiv*]
- **Abdul Muntakim Rafi**[†], Brett Kiyota, Nozomu Yachie, Carl de Boer[†], “Detecting and avoiding homology-based data leakage in genome-trained sequence models”, preprint 2025. [*bioRxiv*]

Journal Articles

- Zimo Jin, Yueming Dong, **Abdul Muntakim Rafi**, Mohsin MD Patwary, Catherine Xu, Morten H. Raadam, Carl de Boer, Codruta Ignea, “Unraveling the regulatory dynamics of bidirectional promoters for modulating gene co-expression and metabolic flux in *Saccharomyces cerevisiae*”, **Nucleic Acids Research** 2025. [*NAR*]
- **Abdul Muntakim Rafi**[†], Daria Nogina, Dmitry Penzar, Dohoon Lee, Danyeong Lee, Nayeon Kim, Sangyeup Kim, Dohyeon Kim, Yeojin Shin, Il-Youp Kwak, Georgy Meshcheryakov, Andrey Lando, Arsenii Zinkevich, Byeong-Chan Kim, Juhyun Lee, Taein Kang, Eeshit Dhaval Vaishnav, Payman Yadollahpour, **Random Promoter DREAM Challenge Consortium**, Sun Kim, Jake Albrecht, Aviv Regev, Wuming Gong, Ivan V. Kulakovskiy, Pablo Meyer, Carl de Boer[†], “A community effort to optimize sequence-based deep learning models of gene regulation”, **Nature Biotechnology** 2024. [*nature*]
- Ishika Luthra, Xinyi E Chen, Cassandra Jensen, Asfar Lathif Salaudeen, **Abdul Muntakim Rafi**, Carl G de Boer, “Biochemical activity is the default DNA state in eukaryotes”, **Nature Structural & Molecular Biology** 2024. [*nature*]
- Dmitry Penzar, Daria Nogina, Elizaveta Noskova, Arsenii Zinkevich, Georgy Meshcheryakov, Andrey Lando, **Abdul Muntakim Rafi**, Carl de Boer, Ivan V Kulakovskiy, “LegNet: a best-in-class deep learning model for short DNA regulatory regions”, **Bioinformatics** 2023. [*BIOF*]
- Nicholas Mateyko, Omar Tariq, Xinyi E Chen, Will Cheney, Asfar Lathif Salaudeen, Ishika Luthra, Najmeh Nikpour, **Abdul Muntakim Rafi**, Hadis Kamali Deghan, Cassandra Jensen, Carl de Boer, “GIL: A Python package for designing custom indexing primers”, **Bioinformatics** 2023. [*BIOF*]
- **Abdul Muntakim Rafi**, Thamidul Islam Tonmoy, Uday Kamal, Jonathan Wu, Md. Kamrul Hasan, “RemNet: Residual Convolutional Neural Network for Camera Model Identification”, **Neural Computing And Applications** 2021. [*SpringerLink*]

Conference Papers

- Uday Kamal, **Abdul Muntakim Rafi**, Rakibul Hoque, Jonathan Wu, Md. Kamrul Hasan, “Lung Cancer Tumor Region Segmentation Using Recurrent 3D-DenseUNet”, The Second International Workshop on Thoracic Image Analysis in conjunction with **MICCAI 2020**, October 2020. [*SpringerLink*]
- **Abdul Muntakim Rafi***, Shivang Rana*, Rajwinder Kaur*, Jonathan Wu, Pooya Moradian Zadeh, “Understanding Global Reaction to the Recent Outbreaks of COVID-19: Insights from Instagram Data Analysis”, **IEEE International Conference on Systems, Man, and Cybernetics, 2020**, October 2020. [*IEEEExplore*]
- **Abdul Muntakim Rafi**, Jonathan Wu, Md. Kamrul Hasan, “L2-Constrained RemNet for Camera Model Identification and Image Manipulation Detection”, Advances in Image Manipulation workshop and challenges on image and video manipulation in conjunction with **ECCV 2020**, August 2020. [*SpringerLink*]
- **Abdul Muntakim Rafi**, Uday Kamal, Rakibul Hoque, Abid Abrar, Sowmitra Das, Robert Laganiere, Md. Kamrul Hasan, “Application of DenseNet in Camera Model Identification and Post-processing Detection”, **The IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, 2019**, pp. 19-28, Long Beach, CA, USA, June 2019. [*CVPR 2019 open access*]
- **Abdul Muntakim Rafi**, Nowshin Nawal, Nur Sultan Nazar Bayev, Lusain Nima, Celia Shahnaz, Shaikh Anowarul Fattah, “Image-based Bengali Sign Language Alphabet Recognition for Deaf and Dumb Community”, **2019 IEEE Global Humanitarian Technology Conference (GHTC)**, Seattle, WA, USA, October 2019. [*IEEEExplore*]

WORKSHOPS CONDUCTED

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- **IEEE EMBS Region 9 Conference**, Guadalajara, Mexico Oct 2023
Invited 3-hour workshop on designing sequence-based gene regulatory deep learning models.
 - **Machine Learning for Genome Editing**, Stem Cell Network, Canada Jun 2023
Invited 1.5-hour workshop covering: utilizing publicly available ML models for genome editing experiments, training neural networks on sequence-to-expression data from Massively Parallel Reporter Assays, and demonstrating when simpler models outperform complex neural networks. (online)
 - **Advanced Genomics & Genome Engineering Workshop**, Michael Smith Laboratories, UBC Sep 2023
Invited 30-minute lecture on designing sequence-based gene regulatory deep learning models.

SELECTED TALKS

- **Characterizing homology-induced data leakage and memorization in genome-trained sequence models** 2026
Models, Inference & Algorithms (MIA) Seminar, Broad Institute of MIT and Harvard, Cambridge, United States
MASSIV 1.0: The Meeting for Advanced Synthetic Biology and Systems Bioengineering, Vancouver, Canada
UBC Life Sciences Symposium 2026, Vancouver, Canada (upcoming)
- **From inflated benchmarks to trustworthy predictions: addressing reliability in genomic models** 2025
Biomedical Horizons Seminar Series, IBM Thomas J. Watson Research Center, New York, United States
- **Detecting and avoiding homology-based data leakage in genome-trained sequence models** 2024-2025
AI in Molecular Biology, Keystone Symposia, Santa Fe, United States
ISMB/ECCB 2025, Liverpool, United Kingdom
Kipoi Seminar (online)
IGVF Consortium, Machine Learning Focus Group Journal Club (online)
Deep Learning in Genomics Journal Club, Johns Hopkins University (online)
Kundaje Lab Journal Club, Stanford University, Stanford, United States
Kelley group Journal Club, Calico Life Sciences, South San Francisco, United States
- **Beyond the genome: engineering and modeling synthetic DNA to uncover cis-regulatory logic** 2025
Tom Ellis Lab, Imperial College London, London, United Kingdom
- **A community effort to optimize sequence-based deep learning models of gene regulation** 2025
Genentech, internal seminar (online)
Biological Data Science, Cold Spring Harbor Laboratory, New York, United States
London SynBio Network Meeting, Imperial College London, London, United Kingdom
- **Evaluation and optimization of sequence-based gene regulatory deep learning models** 2024
Pacific Northwest Yeast Club Meeting, Fred Hutchinson Cancer Center, Seattle, United States
- **Predicting gene expression using random promoter sequences - Challenge Overview** 2022
14th RECOMB/ISCB Conf. on Regulatory & Systems Genomics with DREAM Challenges, Las Vegas, United States
- **Tumor segmentation from CT scans using deep learning** 2021
Guest lecture, ELEC 8280: Image Processing, University of Windsor, Windsor, Canada
- **L2-constrained RemNet for camera model identification and image manipulation detection** 2020
Advances in Image Manipulation Workshop, ECCV 2020 (online)
- **Lung cancer tumor region segmentation using recurrent 3D-DenseUNet** 2020
Second International Workshop on Thoracic Image Analysis, MICCAI 2020 (online)
- **IEEE SPS Video and Image Processing Cup 2018 - Final Round** 2018
IEEE International Conference on Image Processing (ICIP), Athens, Greece
- **Shongket: Bengali sign language alphabet interpreter for the deaf community in Bangladesh** 2018
4th IEEE WIECON-ECE Conference, Thailand (online)

SELECTED POSTERS

- **gRely: Reliability estimation of variant effect predictions for genome trained sequence-to-expression models** 2026
90th Cold Spring Harbor Symposium on Quantitative Biology (AI in Biology), New York, United States (upcoming)
- **Evaluation of active learning selection strategies and characterization of informative sequences for sequence-to-expression models** 2026
90th Cold Spring Harbor Symposium on Quantitative Biology (AI in Biology), New York, United States (upcoming)
- **Detecting and avoiding homology-based data leakage in genome-trained sequence models** 2024
Biological Data Science, Cold Spring Harbor Laboratory, New York, United States
23rd European Conference on Computational Biology (ECCB), Turku, Finland
Machine Learning in Computational Biology (MLCB), Seattle, United States
- **Evaluation and optimization of sequence-based gene regulatory deep learning models** 2023
Machine Learning in Computational Biology (MLCB), Seattle, United States
Kipoi Summit, Zugspitze, Germany

AWARDS AND SCHOLARSHIPS

- **Four Year Doctoral Fellowship (4YF) [UBC]** 2021-2025
AWARD: 96,000 CAD (over 4 years)
UBC's flagship doctoral fellowship providing funding plus tuition to top PhD students.
- **SBME Graduate Support Initiative - Entrance Award [UBC]** 2021
AWARD: 4,000 CAD
Awarded to top-ranked incoming PhD students in SBME.

- **SCN International Travel Award** [SCN] 2025
AWARD: 1,500 CAD
Awarded to trainees to communicate their work internationally and contribute to the visibility of Canadian research abroad.
- **JXTX + CSHL Biological Data Science Scholarship** [JXTX] 2024
AWARD: 1,125 USD
Awarded to six outstanding graduate students in genomics and data sciences for contributions to open science.
- **Stem Cell Network Trainee Award** [SCN] 2023
AWARD: 4,000 CAD
One-time stipend awarded to approximately 100 trainees nationally.
- **Amgen Pitch Competition, 3rd Place** 2023
AWARD: 1,000 CAD
School of Biomedical Engineering, UBC.
- **PharmaHacks 2022, 1st Place** [Devpost] [GitHub] 2022
Won the Phyla Challenge: Classification of Diseases Based on the Gut Microbiome.
- **IEEE SPS Video and Image Processing Cup, 2nd Place** [IEEE SP Magazine] 2018
AWARD: 2,500 USD
Placed 2nd among 28 international teams.
- **IEEE-WIECON-ECE Humanitarian Project Competition, 2nd Place** [YouTube] 2018
AWARD: 500 USD
- **Bangladesh Math Olympiad, Regional Champion** 2011-2013
- **Bangladesh Astro Olympiad, National 4th** 2012
- **Bangladesh Physics Olympiad, Regional Champion** 2012
- **Bangladesh Science Olympiad, National 3rd** 2011

FUNDED PROJECTS

- **Continual improvement of gene regulatory models** 2025-2026
Funding Source: The Digital Research Alliance of Canada
Principal Investigator: Carl de Boer
Total Funding: Priority access to GPUs
Role: Co-wrote the proposal
- **Evaluation, optimization, and continual improvement of sequence-based cis-regulatory models** Aug 2023-June 2024
Funding Source: Advanced Research Computing, UBC
Principal Investigator: Carl de Boer
Total Funding: 20,000 CAD (Microsoft Azure credit)
Role: Co-applicant; wrote the proposal
- **Lossless preprocessing of the sequence and expression space to improve sequence-based gene regulatory models** May-Aug 2023
Funding Source: School of Biomedical Engineering, UBC
Principal Investigator: Carl de Boer
Total Funding: 6,000 CAD
Role: Co-applicant; wrote the proposal and hired a Co-op student through the grant
- **DREAM Challenge 2022** [website] May-July 2022
Funding Source: TPU Research Cloud, Google
Principal Investigators: Carl de Boer (UBC), Pablo Meyer (IBM Research), Jake Albrecht (Sage Bionetworks)
Total Funding: 50 TPU quotas (each: 5 v3-8s, 5 v2-8s, 100 preemptible v2-8s)
Role: Sole graduate student on the organizing committee
- **Identifying selection on human gene expression with gene regulatory models** 2022-2024
Funding Source: The Digital Research Alliance of Canada
Principal Investigator: Carl de Boer
Total Funding: Priority access to GPUs
Role: Co-wrote the proposal
- **Efficient edge inference benchmarking for AI-driven applications** Nov 2020-Mar 2021
Funding Source: Mitacs Accelerate
Principal Investigator: Jonathan Wu
Total Funding: 15,000 CAD
Role: Sole co-applicant; wrote the proposal

- **Spatio-temporal human activity recognition on manufacturing floors**

Oct 2019-Apr 2020

Funding Source: Mitacs Accelerate

Principal Investigator: Jonathan Wu

Total Funding: 22,500 CAD

Role: Co-applicant; assisted with proposal writing

PEER-REVIEW ACTIVITIES

Independent reviewer:

- *Nature Communications* (1 paper)
- *Bioinformatics* (1 paper)
- *Neurocomputing* (4 papers)
- *Computational and Structural Biotechnology Journal* (1 paper)
- *Data in Brief* (1 paper)
- *Journal of Real-Time Image Processing* (1 paper)
- *Cyber-systems and Robotics* (1 paper)
- *ISMB 2026* (1 paper)
- *Machine Learning in Computational Biology 2025* (3 extended abstracts)
- *Generative AI in Genomics (Gen²) workshop, ICLR 2026* (1 paper)

Co-reviewer with PI:

- *Nature* (2 papers)
- *Nature Genetics* (1 paper)
- *PNAS* (1 paper)
- *Genome Biology* (1 paper)
- *Bioinformatics* (1 paper)

OTHER ACADEMIC SERVICE

- B.Sc. thesis committee member, Faculty of Science, University of British Columbia, 2025
- Scientific program committee member, Machine Learning in Computational Biology (MLCB) conference, 2025
- Program committee member, Machine Learning in Computational and Systems Biology track, ISMB conference, 2026

SELECTED MENTORSHIP

- **Bangladeshi Student Research Initiative** [\[website\]](#) 2024-present
Founded a non-profit connecting undergraduate and postgraduate students in Bangladesh with Bangladeshi researchers in academia and industry abroad through free mentorship programs.
- **de Boer Lab** [\[website\]](#) 2023-present
Sole supervisor for five Co-op students on self-designed research projects. One student received SBME Synergy funding. Mentored junior PhD students in the lab.
- **Talaria Summer Institute** [\[website\]](#) 2023
Supervised a high school student on a genomics sequence analysis project through TSI, a free summer STEM research mentorship program for female and genderqueer students.
- **SUS-GSS Mentorship Program** 2022
Mentored second-year undergraduates at UBC on professional development skills.

SELECTED EXTRACURRICULAR ACTIVITIES

- **Project manager, SynBIO6.0** [\[website\]](#) 2024
Managed the organization of SynBio6.0, a two-day national symposium hosted at UBC that brought together ~ 100 Canadian researchers to share advancements and foster collaboration in synthetic biology.
- **President, Bangladeshi Grad Alliance UBC**, University of British Columbia 2024-2025
Co-founded and served as inaugural President of the Bangladeshi Grad Alliance UBC, establishing the organization's first executive committee and organizing community events for Bangladeshi graduate students.
- **Project co-ordinator and organizer, DREAM Challenge 2022** [\[website\]](#) 2022
Co-organized an international competition with 100+ teams (~ 300 scientists) from 75+ universities and companies to build machine learning models for predicting gene expression from DNA sequences. Managed daily operations as the only graduate student on the organizing committee alongside faculty and industry researchers from UBC, IBM Research, and Sage Bionetworks.
- **Secretary, Biomedical Engineering Graduate Association**, University of British Columbia 2021-2022
Organized social and networking events for SBME graduate students, fostering interaction across research groups within the department.

- **Graduate Student Rep**, *SBME Sustainability Committee*, University of British Columbia 2021-2022
Represented graduate students in developing initiatives to integrate sustainable practices into SBME's daily operations and departmental culture.
- **Assistant Treasurer**, *IEEE Joint Chapter SP/COM, IEEE Windsor Section*, University of Windsor 2020-2021
Researched and evaluated financing alternatives, providing recommendations to support chapter operations.
- **Vice President**, *Satyen Bose Science Club*, BUET 2017-2018
Organized scientific talks, seminars, and debates, fostering a culture of active scientific discourse among university students.
- **Assistant General Secretary**, *Satyen Bose Science Club*, BUET 2016-2017
Coordinated event logistics and on-the-ground operations for club-organized events.
- **Volunteer tutor** for *BUET dormitory canteen* 2014-2015
Provided literacy education to underprivileged children and adult workers employed at the university dormitory canteen.
- **Volunteer tutor** for *Bholananda Night High School*, Sylhet 2011-2012
Tutored underprivileged children who worked during the day to support their families, encouraging them to continue their education.

SELECTED MEMBERSHIPS

- **Synbio Canada** [\[website\]](#) 2024-present
Class A voting member.
- **International Society for Computational Biology (ISCB)** [\[website\]](#) 2022, 2024, 2025
- **IEEE Signal Processing Society** [\[website\]](#) 2018, 2020-2021
- **Institute of Electrical and Electronics Engineers (IEEE)** [\[website\]](#) 2018, 2020-2021