# Arghamitra Talukder

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## EDUCATION

09/23-Present (Exp. 05/28) **Columbia University** New York, NY
PhD in Computer Science | NSF CSGrad4US Fellow | GPA: 4.00
*Advisors: Itsik Pe'er, David Knowles*
Courses: Probabilistic Modeling, Computational Genomics, ML in Functional Genomics

01/18 -05/21 **Texas A&M University** College Station, TX
BS in Electrical Engineering | GPA:3.78 | Engineering Honors, Magna Cum Laude

## RESEARCH EXPERIENCE

08/24-Present **Decoding splicing regulation with contrastive learning**
*Graduate Researcher, Columbia University* New York, NY
***Advisor: David Knowles, Itsik Pe'er***

- Developing a state-of-the-art machine learning model using embeddings from Borzoi, Enformer, and HyenaDNA to study intron-mediated splicing regulation.
- Incorporating homologous intron sequences and contrastive learning to enhance cross-species comparisons and detect conserved regulatory elements.
- Leveraging large genomic datasets and Multiple Sequence Alignments to uncover insights into splicing mechanisms and exon expression.

01/24-Present **Isoform quantification with EM and hybrid sequencing**
*Graduate Researcher, Columbia University* New York, NY
***Advisor: David Knowles***

- Designing a novel isoform quantification method combining Expectation Maximization and Variational Inference to improve accuracy using both long- and short-read RNA seq data.
- Leveraging multi-sample RNA-seq integration to reduce biases and enhance detection of low-abundance isoforms for insights into splicing regulation.
- Using PacBio and Illumina sequencing data to capture splicing dynamics, achieving high reliability in quantification metrics

09/23-12/23 **Modeling cell plasticity with lineage and functional single cell data**
*Graduate Researcher, Columbia University* New York, NY
***Advisor: Itsik Pe'er***

- Designed an innovative approach to detect and score cell plasticity by merging cell lineage and gene expression data.
- Implemented the continuous annotation distribution methodology, enabling statistical quantification of cellular plasticity.

07/20-12/22 **Predicting Inter-Protein Contact Maps with Multi-Modal and Multi-Task Learning**
*Undergraduate Research Scholar, Texas A&M University* College Station, TX
***Advisor: Yang Shen***

- Developed an algorithm to predict inter-protein interaction by multi-modal data fusion and embeddings: protein sequence and structure with HRNN, GAT and pre-trained BERT.
- Analyzed the impact of auxiliary task learning via pre-training and multi-tasking.
- Developed an automatic Linux-based framework to manage parameter-tuning, model training and evaluation using High Performance Computer Facility.

06/19-01/21 **Wearable Device Development to Measure Continuous Blood Pressure**
*Research Assistant, ESP Lab, Texas A&M University* College Station, TX
***Advisor: Roozbeh Jafari***

- Developed a cuffless system for continuous blood pressure measurement using bioimpedance and multi-frequency current.
- Created MATLAB tools for data analysis and simulation of arterial blood flow.

## PUBLICATION & PRESENTATION

**Computational Method to Detect Cancerous Plasticity**
Arghamitra Talukder, Itsik Pe'er

07/24 • Oral presentation: IICD Intensive Workshop on Methods in Single-Cell Data Integration and Optimal Transport — New York, NY

04/24 • Oral presentation: CRA-WP Grad Cohort for IDEALS Workshop — Minneapolis, MN

**Isoform Quantification with EM and Hybrid Multiple Samples**
Arghamitra Talukder, David Knowles

06/24 • Poster presentation: Schrödinger's Catalyzing Gender Equity — New York, NY

**Does Inter-Protein Contact Prediction Benefit from Multi-Modal Data and Auxiliary Tasks?**
Arghamitra Talukder, Rujie Yin, Yang Shen, Yuning You

12/22 • Conference paper: Machine Learning in Structural Biology, NeurIPS. — New Orleans, LA

05/21 • Oral presentation: (2nd position out of 75 projects): Electrical Engineering Board Member Presentation, Texas A&M University. — College Station, TX

**Multi-source Multi-frequency Bio-impedance Measurement Method for Localized Pulse Wave Monitoring**
Bassem Ibrahim, Arghamitra Talukder, Roozbeh Jafari

11/20 • Oral presentation: ("Excellence in Research" award): Data Science, Electrical Engineering, Gulf Coast Undergrad Research Symposium, *Rice University.* — Houston, TX

07/20 • Conference paper: EEE Engineering in Medicine and Biology Society. — Montreal, Canada

## FELLOWSHIP & SCHOLARSHIP

12/22 **MLSB, NeurIPS'22 Travel Award**
- Registration allowance to join Machine Learning in Structural Biology workshop.

08/22-Present **CISE CSGrad4US Fellowship, CRA, NSF**
- Cost-of-education (PhD) allowance of $12,000/year to the institution of higher education with an annual stipend of $34,000 for 3 years.

## WORK EXPERIENCE

06/21-08/23 **Product/Test Engineer**
*Texas Instruments* — Dallas, TX
- Responsible for TI customed Ultra-High Voltage test technology with 150% cost efficiency.
- Created a product specific test program converting from legacy tester to the latest technology reducing 40% of the test time.

**Peer Mentor**
*Engineering Academics, Texas A&M University* — College Station, TX

01/19-12/19 Experimental Physics and Engineering Lab II-Mechanics *(Instructor: Anthony Cahill)*
- Supervised lab class of 50 students with experimental data collection and post analysis; 4.8/5.0 review received.

08/18-12/18 Foundation of Engineering *(Instructor: Michael Powell)*
- Guided class of 80 students on introductory Python and LabVIEW: 4.2/5.0 review received.

## VOLUNTEERING EXPERIENCE

11/24 **Columbia Pre-submission Application Review (PAR)** — New York, NY
- Reviewed and provided feedback on for Computer Science PhD applicants

06/24 **Critical Thinking in STEM career panel** — New York, NY
*New York Genome Centre*
- Served as a panelist for a STEM career discussion, mentoring high school students