



TUHIN KUMAR RAUT



ACADEMIC DETAILS

Year	Degree/Board	Institution	CGPA/%
2025*	B. Tech in Biochemical Engineering and Biotechnology	Indian Institute of Technology, Delhi	8.198
2021	Senior Secondary, CBSE	St. Xavier's Senior Secondary School	92
2019	Secondary, CBSE	Vyomayana Samstha Vidyalaya	97.4

SCHOLASTIC ACHIEVEMENTS

- Department Rank 4 among 75 students (top 5%) in the Department of Biochemical Engineering and Biotechnology.
- Received a grant of \$4700 for working on a Nanopore Protein Sequencing project from Emergent Ventures, Mercatus Center.
- Won a Silver medal at the International Genetically Engineered Machines (iGEM) 2023 Grand Jamboree held in Paris.
- Scored 96.94 percentile among 150 thousand + candidates appearing for Joint Engineering Entrance - Advanced (2021).
- Scored 99.62 percentile among 1 million + candidates appearing for Joint Engineering Entrance - Mains (2021).
- Scored an All India Rank of 462 in Kishore Vaigyanik Protsahan Yojana (KVPY-SA) (2020).
- One of 2000 students, among 1 million + students, to receive scholarship for the National Talent Search Examination (2019).

BACHELOR'S THESIS

MD Based Interaction and Translocation Analysis of Peptide through Nanopore (Prof. Ishaan Gupta, DBEB, IIT D) Jul 2024 - Present

- Developed a fully automated Molecular Dynamics (MD) simulation platform for generating the systems.
- Identified the residues in the pore protein CsgG which interact the most with the analytes and involve in entanglement of analyte, using Markov State Models and Hyper-sound Accelerated MD.
- Developed a mathematical model for current output of a nanopore to overcome computational limits of extended MD simulations.

PROJECTS

- **Using AI to generate Novel Protein Sequences** (Prof. Vincenzo Carnevale, ICMS, Temple University) May 2024 – Aug 2024
 - Developed upon a Variational Autoencoder-based model to create a 3-dimensional latent space for the PF00520 family.
 - Made a logistic regression-based model to classify the different GO annotated proteins in the family.
 - Successfully generated novel protein sequences that were statistically indistinguishable from original sequences (based on their embedding distance on a Poincare ball hyperboloid).
- **Understanding Nicotine Addiction** (Prof. Tapan Kumar Nayak, KSBS, IIT D) Dec 2022 – Present
 - Simulated Acetylcholine unbinding from M2R-Go complex (PDB: 7T8X) using Force-Probe MD.
 - Analyzed GPCR dynamics: full structure vs. transmembrane region, to assess G protein impact on ligand unbinding.
 - Identified key residues, loop interactions, and binding pocket volume changes during unbinding.
 - Calculated unbinding energy via Umbrella Sampling to analyze high-energy change conformations.
- **Tunable Biosurfactant Production using Recombinant E. coli** (Prof. Preeti Srivastava, DBEB, IITD) Jun 2023 - Dec 2023
 - Performed MD simulation for the micelle formation by Rhamnolipid (Rha C10-C10) over copper ions and decane.
 - Engineered E. coli to produce Alasan and Rhamnolipid in a tunable manner, based on a bi-directional promoter system and characterized their potency using Oil Displacement Assay and Emulsification Index.

TECHNICAL SKILLS

- **Programming Languages:** - Python (Tensorflow, Keras, Pytorch, Pythae, Biopython, SciPy, Sci-Kit), Bash, HTML, LaTeX.
- **Tools and Softwares:** - GROMACS, NAMD, VMD, PyMOL, GeneRunner, SnapGene, BioRender, AWS.
- Familiar with working on High Power Computing Services and Local Servers in Linux Environment and Process Nodes Optimization.

POSITIONS OF RESPONSIBILITY

- **Overall Coordinator**, iGEM Club Apr 2024 - Present
 - Led a team of 25 members, encouraging early research involvement among the undergraduates.
 - Developed projects in Biophysics and Cancer research through various institutes and external grants.
 - Conducted various workshops and knowledge transfer sessions by collaborating with various industrial experts.
- **Coordinator**, iGEM Club Apr 2023– Apr 2024
 - Contributed to wet lab and dry lab research, organised conclaves, and cultivated robust inter-team collaborations.
 - Spearheaded educational outreach programs for high school students, catalysing synthetic biology awareness.
 - Presented the poster of “Tunable Biosurfactant Production using recombinant E.coli” in Biosphere, 2024 (IITD).

PUBLICATIONS

1. Tyagi, R., Srivastava, S., **Raut, T.K.**, Kartha, S., & Sharma, S. (in press), “A novel functional screening-based method for generation of synthetic microbial community: Case study with control of Fusarium wilt in pigeonpea”, Biology and Fertility of Soils.
2. **Raut, T.K.**, Dhanoa, P., Jayakumar, A., Srivastava, P., & Sundar, D. (in press), “Recent advancements in the application of biosurfactants for the treatment of textile waste and industrial effluents.” In “Biosurfactants for a Sustainable Textiles Industry”, Royal Society of Chemistry.