

Unnati Moradiya

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Education

Northeastern University, Boston, MA

Sept 2024 – Dec 2026

M.S. Bioinformatics

Coursework: Bioinformatics Programming, Computational Biology, Genomics, Transcriptomics, Biostatistics, Data Analytics

Gujarat Technological University, Gujarat, India

July 2023 – June 2024

Post-Graduate Diploma in Bioinformatics

Coursework: R and Bioconductor, Biomathematics & Biostatistics, Linux and Python for Bioinformatics, Data Mining & Visualization

Skills

- **Languages and Workflows:** Python, R, Bash Scripting, Shell Scripting, Jupyter Notebook, Nextflow, Docker, Singularity, Galaxy Workflow, Discovery SLURM, Git/GitHub
- **NGS and Bioinformatics Tools:** HISAT2, STAR, featureCounts, FastQC, MultiQC, fastp, Picard, Cutadapt, SAMtools, BEDTools, GATK, FreeBayes, SnpEff, ClinVar, DESeq2, Seurat, Scanpy, BLAST, Biopython, MEGA, ClustalW
- **Data Analysis and ML:** Differential Expression Analysis, Pathway Enrichment (GO, KEGG, GSEA), PPI Network Analysis, PCA, UMAP, Statistical Modeling, ML (Scikit-learn, Weka), Data Visualization, QC
- **Computing & Databases:** Linux/Unix, HPC Cluster (Discovery SLURM), AWS, AutoDock, PyMOL, NCBI, EMBL-EBI, UniProt, GenBank, PubMed, PDB, CARD, ClinVar, DDBJ

Research Experience

BalanX Bio

July 2026 – Present

Bio Researcher Intern

- Conduct systematic **literature review and data extraction** on biomarker and microbiome research; screen primary studies for relevance and methodological quality to support ongoing internal research initiatives and inform downstream analysis decisions
- Build and maintain a structured **project database** to organize extracted findings, enabling consistent cross-team reference, reuse, and traceability across ongoing research efforts and future analysis cycles
- Collaborate closely with the team's **AI initiative**, contributing to literature synthesis and data organization workflows that support broader research, analysis, and reporting goals across the organization

Antimicrobial Discovery Center, Northeastern University, Boston, MA

Jan 2025 – Apr 2025

Research Assistant

- Wrote a custom **Python** script to query and retrieve 16S rRNA FASTA sequences from NCBI across ~12,000 bacterial species; collected ~2,000 sequences for large-scale comparative genomic analysis across diverse bacterial taxa
- Performed **multi-sequence alignment** (ClustalW/MEGA) of ~2,000 sequences and constructed a **phylogenetic tree** to characterize antimicrobial resistance mechanisms across species; integrated multi-source genomic datasets for cross-species comparison
- Analyzed bacterial genomes and **biosynthetic gene clusters (BGCs)** linked to antimicrobial activity and resistance; collaborated with wet-lab scientists to align computational outputs with experimental objectives throughout the discovery process

Rapture Biotech, Ahmedabad, India

May 2023 – Dec 2023

Bioinformatics Research Intern

- Built end-to-end **NGS variant calling pipeline** on Galaxy: quality control, read alignment, variant calling (**FreeBayes/GATK**), and functional annotation (**SnpEff/ClinVar**); maintained reproducible, documented, version-controlled code
- Interpreted prioritized variants within neuronal and synaptic signaling pathways to support therapeutic target identification; prepared structured analytical summaries and recommendations to guide further experimental validation
- Collaborated with interdisciplinary research teams throughout; demonstrated ability to work across computational and biological domains on a shared therapeutic target identification effort

Projects

Cancer Driver Explorer: TCGA-LUAD Somatic Mutation Landscape | [GitHub](#)

2026

- Downloaded and parsed **3.6 million somatic mutations** across 585 TCGA-LUAD patients via the **GDC API** (Bash) and Python (pandas)
- Applied nucleotide-context normalization (Dietlein et al. 2020, *Nature Genetics*) to distinguish true cancer drivers from large-gene artifacts, flagging **TTN** as a false-positive top hit despite its high raw mutation count
- Identified **TP53** mutated in ~38% of patients with a dominant C>T tobacco-signature mutation pattern; generated oncoprint and MAF summary visualizations in **R** (**maftools**)

Bulk RNA-seq Pipeline: Dexamethasone Treatment in Airway Smooth Muscle Cells | Northeastern University | [GitHub](#)

Feb – Mar 2026

- Built end-to-end **bulk RNA-seq pipeline** (FastQC/MultiQC, fastp, HISAT2, featureCounts, **DESeq2**) on GSE52778, identifying 823 significant DEGs (padj < 0.05, llog2FCI > 1)
- Resolved a local storage constraint (150GB required vs. 50GB available) by aligning to chromosome 1 for upstream QC, while running **DESeq2** statistical testing on the full validated 8-sample count matrix to preserve result validity
- Confirmed treatment-driven transcriptional separation via **PCA**; designed the pipeline for **full-genome HPC** deployment with reproducible, version-controlled code

scRNA-seq Replication: VSMC Phenotypic Transition in Abdominal Aortic Aneurysm | Northeastern University

Sept – Dec 2025

- Reproduced a published **scRNA-seq** analysis of healthy vs. AAA VSMCs using both **Seurat** (R) and **Scanpy** (Python)
- Executed quality control, normalization, PCA/UMAP dimensionality reduction, clustering, and marker gene discovery to characterize cell population-level phenotypic transitions in both platforms
- Confirmed adipogenic and phenotypic transition signals via differential expression and **GO/KEGG** pathway analysis, independently validating the original published findings

RNA-seq Differential Expression Analysis: Breast Cancer (GSE122763)

July – Aug 2025

- Analyzed GSE122763 (breast cancer vs. matched normal tissue) on Galaxy, performing quality control and reference alignment with **HISAT2** to generate a gene-level count matrix
- Applied **DESeq2** for normalization, statistical modeling, and **FDR control** to identify significantly differentially expressed genes
- Produced publication-quality **volcano plots and heatmaps**; maintained a reproducible, well-documented analytical workflow

Leadership

Curry Student Center, Northeastern University, Boston, MA

May 2025 – Present

Building Manager

- Oversee daily operations and **staff management** across shifts; coordinate with facilities and event teams for seamless event execution
- Conduct routine **safety inspections**, enforce building policies, and manage room booking and space allocation for student organizations and university departments