R RANGA SUDHARSHAN

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EDUCATION

Indian Institute of Technology (BHU), Varanasi *Oct 2023*
Integrated Dual Degree (B.Tech + M.Tech) in Bioengineering and Biomedical Technology
CGPA: 8.63/10.0

WORK EXPERIENCE

University of Michigan, Ann Arbor *Nov 2023 - Present*
Lead Bioinformatician, Pancreatic Cancer Lab [link]
Research Specialist Lab Associate, Systems Imaging and Bioinformatics Lab [link]
Visa: H1B (Valid till Nov 2026)

JOURNAL PAPER PREPRINTS

TIGIT as a mediator of immune suppression in COMPASS-like complex gene-mutated pancreatic cancer S. Zhang, E. R. Daniels, J.M, **Ranga Sudharshan**, H. C. Kim, D.G.T, S. Krishnan, T. L. Frankel, E. Hissong, A. Rao, N. Assarzadegan, J. Shi *In Review - Modern Pathology (I.F: 5.5)*

QHGM: Quantum Hamiltonian-Based Generative Model for Gene Regulatory Network Inference M. Sohail, **Ranga Sudharshan**, S. Pradhan, A. Rao
Submitted to Nature Methods

Rewiring Oncogenic Transcriptional Complexes with Domain-ALTeration Chimeras (DALTACs) in Prostate Cancer J. Luo, J. Yang, J. C. Tien, … **Ranga Sudharshan**, A. Rao, A. Chinnaiyan, et. al
Submitted to Nature Genetics

CONFERENCE PAPERS AND ABSTRACTS

QubitLens: An Interactive Learning Tool for Quantum State Tomography [link]
M.A.Sohail, **Ranga Sudharshan** S. Pradhan, A. Rao [QSEEC IEEE Quantum Week 2025, ABQ]

Spatial multi-omics reveal distinct immunosuppressive lipid-laden macrophages in primary CNS lymphoma compared to systemic DLBCL
[Co- author (ASH 2025, FL – oral presentation)] [link]

Abstract: TIGIT-mediated immune suppression in KMT2D-mutant pancreatic cancer
[Co author (AACR 2025)] [link]

Abstract: Epigenetic Tumor Suppressor KMT2D Shapes the Immune Landscape in Pancreatic Cancer [Co-author (AACR 2025)] [link]

Abstract: KMT2D Loss Induces Enrichment of Plod2+ Fibroblasts in Pancreatic Cancer
[Co-author (AACR 2025)] [link]

Comparing Perturbagens from Differential Gene Expression Data Analysis of ASD using Random Forest and Statistical Test. Ranga Sudharshan, S. K., P., B.M.G., R. Jac.F.A.
[(Current Directions in Biomedical Engineering, 2023)] [link]

AWARDS, TALKS AND OUTREACH

DAAD (KOSPIE) Scholar – Awarded Combined Study and Practice Stays Scholarship (declined).

IBGAA Graduate Student Admission Scholarship, IIT BHU Alumni Association ($700).

Gave a talk titled "Simplifying quantum state tomography using maximum likelihood estimation"
IEEE International Symposium on Information Theory 2025 [link]

Founding Member, Research Community, IIT BHU
Mentored 25+ sophomores for research internships. [link]

ONGOING RESEARCH PROJECTS

Spatial Analysis of Dormant Breast Cancer Cells in the Bone Marrow Microenvironment
Collaborator: Dr. Grace Bushnell (University of Minnesota)

- Processed 2 µm Visium HD spatial transcriptomics data using Bin2Cell for segmentation and deconvoluted with a bone marrow single-cell atlas via RCTD; registered cytokeratin-positive cells from IHC and annotated tumor cells with nearest-neighbor mapping.
- Performed neighborhood enrichment and computed Moran's I to assess spatial co-localization and autocorrelation of cell types and top differentially expressed genes.
- Applied GMM clustering to identify tumor cell clusters and compared the immune microenvironment of clustered versus singlet tumor cells.

Transcriptomic Profiling of Alveolar Type II Cell Memory Programs using scRNA-seq
Collaborator: Dr. Anukul Shenoy (Department of Microbiology and Immunology, UM Ann Arbor)

- Performed scRNA-seq analyses on FACS-purified AT2 epithelial cells and validated two conserved memory programs (ITEM/MHC-I and ATEM/MHC-II).
- Conducted differential expression and pathway enrichment analyses (KEGG, GO, MSigDB) using clusterProfiler and inferred transcription factor activity with Decoupler (ULM + CollecTRI database) to characterize regulatory programs.
- Integrated microarray datasets, consolidating diverse perturbation phenotypes (STAT1-, IL-17A/F-, IFN-γ-) to strengthen mechanistic models of epithelial memory.

Variational Hamiltonian Learning of Cell-Cell Networks Across Tumor Progression Landscapes
Collaborator: Dr. Sandeep Pradhan (Dept. of Electrical Engineering, UM Ann Arbor)

- Converted CODEx image patches into continuous cell-density trajectories using kernel density estimation and ordered tumor cells into pseudo-temporal "quantiles" to approximate progression.
- Applied variational Hamiltonian learning using an Ising model, where cell-density trajectories serve as time-dependent observations to recover interaction weights of a parameterized Hamiltonian.
- Engineered POVM-based likelihood estimation with tensor contractions for 4^n outcome probabilities and fully JIT-compiled optimization using JAX and Optax.

TEACHING EXPERIENCE

Teaching Assistant Jan 2023 – May 2023
Computational Neuroscience Lab, School of Biomedical Engineering,IIT (BHU)

Teaching Assistant Aug 2022 – Nov 2022
Nano-Cellular Medicine and Biophysics Lab, School of Biomedical Engineering,IIT (BHU)

TECHNICAL SKILLS

Programming	Python, R, C; Git; Bash (Slurm HPC)
Quantum/Computational Tools	PennyLane, Qiskit, TensorFlow, PyTorch, scikit-learn, NLTK
Bioinformatics Tools	Scanpy, scVI, Seurat, ArchR, C-Side, Decoupler, InferCNV, Giotto