SHRI VISHALINI RAJARAM

Human Toxicology | Oral Microbiome | Computational Biology | Multi-Omics
Iowa City, IA • shrivishalini-rajaram@uiowa.edu • 319-471-5530
LinkedIn • GitHub • Personal Page

EDUCATION

Doctor of Philosophy – Human Toxicology **08/2022 - Expected 05/2027**
The University of Iowa, Iowa City, IA, United States (GPA – 4.08)

Master of Technology - Computational Biology **09/2018 - 05/2020**
Alagappa College of Technology, Anna University, Chennai, India (GPA – 3.94)

Bachelor of Technology - Genetic Engineering **08/2013 - 05/2017**
Bharath Institute of Higher Education and Research, Chennai, India (GPA – 3.8)

EXPERIENCE

Graduate Research Assistant – College of Dentistry, The University of Iowa, IA, USA **08/2022 to Present**

- Coordinate and contribute to 12 concurrent computational biology projects, collaborating with cross-institutional teams (State Hygienic Laboratory & College of Dentistry) to deliver scalable and reproducible analysis solutions.
- Analyze 10 metagenomic, 10 metatranscriptomic, and two metaproteomic datasets (~17 TB total), profiling bacteria, fungi, viruses, and archaea across multi-kingdom microbiomes.
- Build and deploy containerized, reproducible pipelines (R, Python, Bash) orchestrated with Nextflow and Snakemake, optimized for high-throughput processing on the Argon HPC (SGE).
- Benchmark 22 differential abundance/expression methods, from conventional count-based approaches to advanced longitudinal and zero-inflated models, establishing reproducibility standards for large-scale microbial analyses.
- Develop a machine learning framework that integrates six feature selection strategies with seven classification algorithms, containerized with Docker/Singularity for reproducible deployment and performance benchmarking.
- Mentor junior researchers in pipeline design, reproducibility practices, and computational project management, fostering lab-wide adoption of industry-aligned workflows.

SKILLS

Programming & Machine Learning: R, Python, Bash, HPC job schedulers (SGE/SLURM); machine learning (SVM, Random Forest, Gradient Boosting)
Workflow & Reproducibility: Nextflow, Snakemake, Docker, Singularity, Conda/Mamba, Git/GitHub Actions
Statistics: Multivariate analysis; differential analysis (cross-sectional, longitudinal, zero-inflated models)
Sequencing Data Analysis: 16S rRNA, shotgun metagenomics; NGS (bulk RNA-Seq, DNA-Seq)
Microbiome Analysis:
*Taxonomic profiling***:** QIIME2, DADA2, Kraken2/Bracken, MetaPhlAn
Functional annotation: HUMAnN3, eggNOG-mapper, InterProScan
Proteomics: LC-MS/MS (DDA/DIA) – FragPipe, Philosopher, IonQuant, Unipept CLI
Multi-omics integration: mixOmics, network analysis

PUBLICATIONS

- Sanyal, P., Uppada, J., Sinha, S., Bhat, Y., Khan, S., **Rajaram, S.V.,** Albert Arokiyaraj, E., Jhingan, G.D., Agarwal, N., Samal, A., Nandicoori, V.K. (2025). Sec and Tat mediated secretion safeguards Mycobacterium tuberculosis membrane homeostasis. bioRxiv preprint (Cold Spring Harbor Laboratory). https://doi.org/10.1101/2025.09.04.674216
- Shen, Y., **Rajaram, S. V.,** Wang, W., & Zeng, E. (2025). DeepBioSim: Efficient and Versatile Methods for Microbiome Data Simulation with Minimal Statistical Assumptions. bioRxiv preprint (Cold Spring Harbor Laboratory). https://doi.org/10.1101/2025.08.21.670443

- **Rajaram, S. V.,** Singh, P., & Zeng, E. (2025). Metatranscriptomic analysis reveals toxin-antitoxin system shifts in caries-associated oral microbiomes. bioRxiv preprint (Cold Spring Harbor Laboratory). https://doi.org/10.1101/2025.08.07.669164
- Sahoo, A. K., Vivek-Ananth, R. P., Chivukula, N., **Rajaram, S. V.,** Mohanraj, K., Khare, D., ... & Samal, A. (2023). T9GPred: A Comprehensive Computational Tool for the Prediction of Type 9 Secretion System, Gliding Motility, and the Associated Secreted Proteins. ACS omega, 8(37), 34091-34102.

HONORS AND AWARDS

ACT Graduate Scholars Fellowship - Graduate College, University of Iowa **08/2025 – 05/2027**
- Competitive fellowship supporting graduate researchers in translational science; $27,500 stipend + $1,500 professional development.

Graduate Teaching Fellowship – Center for Teaching, University of Iowa **08/2025 – 05/2026**
- Evidence-based pedagogy fellowship with SoTL training and teaching-as-research project "The Art of Teaching Across Borders"; $750 per semester stipend for participation and research.

James S. and Janice I. Wefel Memorial Research Award for Cariology – University of Iowa
- $1,600 award supporting conference travel and research proposal "Functional identification of toxin-related microbial genes from oral metatranscriptomics." **07/2025 – 12/2026**
- $2,500 award supporting conference travel and research proposal "Identifying prognostic biomarkers in multi-omics and cross-kingdom microbial interactions." **07/2024 – 12/2025**

II Place, Oral Presentation – Jakobsen Graduate Research Showcase, University of Iowa **03/2025**
- Gene activity changes in oral bacteria during dental caries and treatment.

I Place, Oral Presentation – AADOCR Iowa Section Annual Meeting, University of Iowa
- Functional Shifts of Toxin-Related Microbial Genes in Dental Caries. (Category: James S. Wefel and Janice I. Wefel Memorial Fund Competition) **02/2025**
- Multi-omics comparison of Oral Mycobiome. (Category: Max Smith Oral Presentation Pre-Doctoral Competition) **03/2025**

Selected Poster Presentation – ASM NGS Conference, Washington, D.C. **10/2024**
- Comprehensive evaluation of differential abundance methods for multi-omics oral microbiome data.

Selected Oral Presentation – IADR/AADOCR/CADR General Session, New Orleans, LA **03/2024**
- Multi-omics comparison of bacteria, fungi, and viruses in the oral microbiome.

LEADERSHIP EXPERIENCES

American Association for the Advancement of Science (AAAS) **09/2025 – 05/2026**
- Selected as the AAAS Superhero for the STEAM Enthusiasts Community - Lead engagement for a 342-member cross-discipline STEAM community, initiating discussions, designing monthly events, and fostering collaboration between graduate students, educators, and researchers across science and the arts.
- Implement strategies to increase participation and enhance interactions, strengthening community dialogue around STEAM integration and outreach.

American Society for Microbiology (ASM) **05/2025 – 05/2027**
- Selected among 151 graduate students worldwide for the Future Leaders Mentorship Program (FLMF) - Collaborate with five mentors and the One Health group. Coordinate structured mentorship activities and professional development, strengthening leadership, communication, and global scientific networks.

National Science Policy Network (NSPN) **06/2023 – 06/2024**
- Directed creative strategy for 15+ events and reviewed 30+ grants, strengthening national science communication and early-career researcher support.