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

SUMMARY

- Interdisciplinary PhD candidate working on 3 collaborative projects and a molecular data analysis resource for oral microbiome with 10 whole genome and 2 mass spectrometry multi-omics datasets.
- An avid researcher and a passionate biology educator – trained 854 students in computational biology, science communication, and personality development.
- Assisted over 10 researchers, quickly grasped concepts, and is a formidable organizer.
- The brain behind a futuristic startup - Build Geeks Private Limited

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)

PROFESSIONAL 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.

Co-founder & Chief Executive Officer - Build Geeks Private Limited, Tamil Nadu, India **07/2020 to 07/2022**

- Trained 854 students (undergraduates, master's, and early-career researchers) in computational biology, bioinformatics, statistical analysis, science communication, and professional development.
- Assisted 30+ academicians, researchers, and industry professionals in bioinformatics analysis, statistical modeling, and scientific writing.
- Designed and delivered short courses and workshops on computational biology, R/Python for data analysis, and applied statistics.
- Developed and launched the prototype of "Dr. Solve", a biology-based educational game for high school and undergraduate students.

PUBLICATIONS

1. 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
2. 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
3. **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
4. 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.
5. **Shri Vishalini R***, Dr P Rajasulochana: A Novel Approach to Synthesis and Characterization of Silver Nano Particles of Feverfew Seeds. J. Chem. Pharm. Res., 2016, 8(1):690-697.

RESEARCH INTERNSHIPS

Project Intern – The Institute of Mathematical Sciences, Tamil Nadu, India **06/2019 to 06/2020**

- Worked under the mentorship of Dr. Areejit Samal on systems biology and network reconstruction projects focused on bacterial protein secretion systems.
- Progressed from Project Intern to Master's Thesis Student, leading multiple projects in theoretical computational biology.
- Conducted biocuration and computational modeling of all nine protein secretion systems across Gram-positive and Gram-negative bacteria.
- Specialized in Mycobacterium tuberculosis secretion machinery, tracing protein transport from cytoplasmic translation to extracellular release.
- Contributed to the development of computational resources for secretion system prediction, including type IX secretion system (T9SS) research.

Research Intern – Madurai Kamaraj University, Tamil Nadu, India **11/2017 to 05/2018**

- Worked under the mentorship of Dr. Kumaresan Ganesan on cancer genetics projects focused on gastric cancer biology.
- Evaluated potential therapeutic targets of the extracellular matrix in gastric cancer, analyzing gene expression and ChIP-Seq data to characterize dysregulated ECM pathways and associated biomarkers.
- Investigated HNF4 therapeutics and prognosis, identifying candidate drugs from ChIP-Seq data and testing efficacy and toxicity in gastric cancer cell lines (IM95, YCC3, YCC6).

Project Intern – Council for Scientific and Industrial Research – Central Salt Marine Chemicals Research Institute, Gujarat, India **09/2016 to 03/2017**

- Worked under the mentorship of Dr. Pramod B. Shinde on natural product discovery from actinomycetes, integrating biochemical, analytical, and in silico approaches.
- Conducted the Bachelor's dissertation project on Arthrobacter sp., characterizing secondary metabolites through biochemical assays, toxicity screening, and analytical evaluation (HPLC, LC-MS), complemented by genome annotation and bioinformatics-based metabolite prediction.
- Executed an OSMAC (One Strain–Many Compounds) study in Streptomyces sp., optimizing culture conditions to generate metabolic diversity and characterizing secondary metabolites with analytical pipelines.

CONFERENCES

Oral Presentations

1. **2nd Place Award** for Oral presentation on **"Gene activity changes in oral bacteria during dental caries and treatment"** in the Jakobsen Graduate Research Showcase 2025**,** University of Iowa, Iowa City, IA (March 2025)
2. **I Place Award** for Oral presentation on "**Functional Shifts of Toxin-Related Microbial Genes in Dental Caries**" in the 2025 James S. and Janice I. Wefel Memorial Fund Graduate/Post-Doctoral Competition at the AADOCR Iowa Section Annual Meeting, University of Iowa, Iowa City, IA (February 2025)
3. Oral presentation on "**Investigating the Changes of Toxin-Related Gene Expression in the Oral Metatranscriptome of Dental Caries**" in Central States – Midwest Regional Chapters of Society of Toxicology, 2024 Annual Meeting, AI tools in toxicology, Iowa City, IA (October 2024)
4. Oral Presentation on "**Multi-omics comparison of bacteria, fungi, and viruses in oral microbiome**" in 2024 IADR/AADOCR/CADR General Session and Exhibition, New Orleans, LA (March 2024)
5. **I Place Award** for Oral presentation on "**Multi-omics comparison of Oral Mycobiome**" in the 2024 Max Smith Graduate/Post-Doctoral Competition at the AADOCR Iowa Section Annual Meeting, University of Iowa, IA (February 2024)

Poster Presentations

1. Poster Presentation on "**Comprehensive evaluation of differential abundance methods for multi-omics oral microbiome data**" in American Society of Microbiology - Conference on Rapid Applied Microbial Next-Generation Sequencing and Bioinformatic Pipelines (ASM NGS), Washington, D.C. (October 2024)
2. Poster Presentation on "**Gene expression data and machine learning approaches unveils drug-induced liver injury (DILI) biomarkers**" in Central States Regional Chapter of Society of Toxicology, 2023 Annual Meeting, One World, One Health, One Toxicology, Lincoln, NE (October 2023)
3. Poster Presentation on **"An (incomplete) blueprint on the protein secretion machinery in *Mycobacterium tuberculosis"*** in *Mycobacterial* heterogeneity and host tissue tropism at India | EMBO symposium 2020, New Delhi, India (February 2020)
4. Poster Presentation on **"Identification of pathways to be targeted for diffuse type Gastric tumors with dysregulated Extracellular Matrix"** at 49th Aqua-Terr Annual Conference on Biological Sciences at Madurai Kamaraj University, Madurai, India (February 2018)

Attended

1. **Festival of Genomics and BioData**, Boston, MA (June 2025)
2. **Central States Chapter of the Society of Toxicology (CS-SOT)** annual meeting, Kansas City, KS (October 2022)
3. **AVIDADHAM'19- Metamorphosis from academia to industrialization,** an International Conference organized by the Center for Biotechnology, Anna University, Chennai (February 2019)
4. Symposium on **Genetic Diseases**: From Mendelian to Malignancies**,** Indian Institute of Technology (IIT-Madras), Chennai, India (August 2015)
5. **Indian Genetics Congress**, SRM University, Chennai, India (March 2015)

GRANTS AND FELLOWSHIPS

American College Testing (ACT) Graduate Scholars Fellowship - University of Iowa, USA 08/2025 – 05/2027

- Competitive fellowship supporting graduate researchers in translational science; $27,500 stipend + $1,500 professional development.

Graduate Teaching Fellowship – University of Iowa, USA **08/2025 – 05/2026**

- Evidence-based pedagogy fellowship with SoTL training and teaching-as-research project "The Art of Teaching Across Disciplinary Borders"; $750 per semester stipend for participation and research.

James S. and Janice I. Wefel Memorial Research Award for Cariology – University of Iowa, USA

- $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**

Travel Grants – University of Iowa, USA **03/2024**

- $1,000 award supporting conference travel from Graduate and Professional Student Government and Graduate Student Senate

Professional Development Fund - National Science Policy Network, USA **03/2024**

- $500 supporting conference travel

Master's Student Scholarship – Department of Biotechnology, India **09/2018 – 05/2020**

- Stipend during master's coursework for students admitted via the All India entrance examination.

PROFESSIONAL CERTIFICATIONS

Graduate Certificate – College Teaching **01/2025 - Expected 12/2025**
The University of Iowa, Iowa City, IA, United States

Graduate Certificate – Biostatistics **08/2024 - 05/2025**
The University of Iowa, Iowa City, IA, United States (GPA – 4.08)

TEACHING EXPERIENCE

Teaching Assistant - Intermediate Statistical Methods **01/2025 – 05/2025**

- Delivered coding walkthrough sessions in R for advanced regression methods (LASSO and Ridge).
- Facilitated case study discussions linking methods to applied research.
- Hosted weekly office hours (2 × 1.5 hrs) to support student learning.
- Contributed to course delivery through active discussions and collaborative teaching.

Co-Instructor - Statistical Methods for Dental Research **08/2025 – 12/2025**

- Taught basic statistics with specific dental examples and active learning methods.
- Led interactive case study walk-throughs on the concepts.

Graduate Teaching Fellowship **08/2025 – 12/2026**

- Participate in biweekly discussions on evidence-based teaching, active, and alternative pedagogy.
- Perform Teaching as Research on the proposed project "Teaching across disciplinary borders – a mixed methods research"

Center For Integrated Research, Teaching, And Learning Certifications
Practitioner Level **06/2025**

- Completed IRB training, research methods, Scholarship of Teaching and Learning systematic literature review and project proposal

Associate Level **01/2025**

- Completed Teaching as Research and TILE Teaching series

SERVICE TO THE PROFESSION

JOURNAL REVIEWER

Scientific reports 7 reviews

STUDENT ORGANIZATIONS

Human Toxicology Student Advisory Committee (ToxSAC) – University of Iowa

Chair **07/2025 – 06/2026**

- Began term as Chair, planning events and hosting monthly meetings to support graduate student engagement and departmental community.

Vice Chair **07/2024 – 06/2025**

- Supported organization of the Central States–Midwest Regional SOT 2024.
- Coordinated departmental Lunch & Learn series with toxicology seminar speakers.
- Organized student meet-and-greet events and special workshops, including a comprehensive exam panel, a mental health workshop, and a career center resources session.
- Secured a $1,500 Terrace Grant and hosted a mental health workshop in collaboration with the UI Counseling Center and the Graduate Student Association for Counseling Psychology.
- Raised ~$2,200 in funds during the academic year for the events.

Programming Director **07/2023 – 06/2024**

- Managed ToxSAC's social media presence to promote events and activities.
- Created the academic year newsletter, highlighting program updates and student achievements.

Connecting Science to Society – University of Iowa, USA

Treasurer **07/2024 – 06/2026**

- Organized career panels highlighting science communication and policy careers.
- Participated in Science on the Ballot civic science initiative.
- Managed chapter finances and supported event planning.
- Published "Research at UIowa: A Comic Series" in Synthesis: Journal for Student Science Communication.

President **07/2023 – 06/2024**

- Directed programming, expanded membership, and coordinated outreach initiatives.
- Secured a $2,932 NSPN chapter microgrant for creating "Research at UIowa - A Comic Series"

PROFESSIONAL SOCIETY MEMBERSHIPS

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.