VINNI N. G.
Research Assistant
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EDUCATION

MSc. in **Computational Biology Specialization in NGS Data Analytics** 2021-2023
Department of Computational Biology and Bioinformatics, University of Kerala, India
Grade: A (CGPA 8.27 out of 10)

BSc. in **Biotechnology** 2018-2021
University of Calicut, Kerala, India
Grade: B (CGPA 3.96 out of 6)

Higher Secondary Examination (Board of Higher Secondary Examination, Kerala, India) 2016-2018
Government Fisheries Higher Secondary School, Kerala, India
Percentage Marks: 90.5%

Secondary School Leaving Certificate (Board of Public Examination, Kerala, India) 2016
Government Fisheries Higher Secondary School, Kerala, India
Percentage Marks: 95%

RESEARCH EXPERIENCE

Research Assistant *15th June 2024 – present*
Department of Chemistry, CMS College Kottayam, Kerala, India
Supervisor: Dr. Vibin Ipe Thomas

- Project 1: **A Fuzzy Logic-Based Framework for Predicting Zoonotic Spillover Risk of Nipah Virus Mutations**
  This project is based on fuzzy theory to create a logic-based model to predict zoonotic spillover risk of Nipah virus mutations. The system uses rule-based inference to estimate host-jump potential without machine learning.
- Project 2**: Investigation on the Degradation Mechanism of Aliphatic Amines with OH Radical: A Computational Study**
  Contributing to a computational chemistry project focused on modeling amine degradation pathways using quantum chemical methods.
- Project 3: **Identifying host-specific patterns in viral protein sequences to predict host spillover risk in animal and plant kingdoms.**
  Developed a Bayesian probability-based model (SPHAK) to predict virus family and host spillover in animal and plant viruses using a unified methodology. Analysed protein sequences from 1,758 virus species across 18 families to estimate cross-host transmission risk.

Research Intern *11th October 2023 – 31st January 2024*
Indian Institute of Information Technology, Kottayam, Kerala, India
Supervisor: Dr. Manu Madavan

- Project: **Classification of Alzheimer's related miRNAs**
  This project aims to develop a method to classify microRNAs associated with Alzheimer's disease. This involves using machine learning techniques to analyze miRNA data and identify patterns that differentiate between healthy and Alzheimer's affected individuals.

M.Sc. Research Project *17th April 2023 – 4th August 2023*
Indian Institute of Science Education and Research, Bhopal, India
Supervisor: Prof. Himanshu Kumar

- Project: **Identification of Dysregulated miRNAs in Breast Cancer Using Transcriptome Analysis**
  This study identifies dysregulated miRNAs in breast cancer in 14 datasets through differential expression analysis using limma and DESEQ2 in microarray and NGS datasets respectively and then performs network analysis.

B.Sc. Research Project *7th December 2021 – 10th July 2021*
Department of Biotechnology, St Mary's College, Thrissur, Kerala, India
Supervisor: Dr. Prasanna R Kovath

- Project: **Comparative Study on Cultivation of Oyster Mushroom Pleurotus Ostreatus on Different Substrates and its Chemical Analysis, Protein Estimation, and Antimicrobial Activity**

This study investigated the effect of substrate on the growth, yield, and nutritional composition of domestically grown oyster mushrooms, as well as their antimicrobial activity.

COMPUTATIONAL SKILLS

- **NGS Data Analysis**: RNA-seq, microarray, variant calling, ChIP-seq, and metagenomic analysis; preprocessing (FASTQC, Trimmomatic), alignment (HISAT2, STAR, Bowtie2, BWA), quantification (featureCounts, HTSeq), differential expression analysis (DESeq2, edgeR, limma), peak calling (MACS2), variant calling and annotation (GATK, SAMtools, VEP), and taxonomic profiling (Kraken2, MetaPhlAn).
- **Protein Structure Prediction & Analysis**: Homology modeling (SWISS-MODEL, AlphaFold), docking (AutoDock, PyRx), MD simulations (GROMACS), and visualisation (PyMOL)
- **Computational Chemistry**: Quantum chemical calculations and reaction modeling using Gaussian and GaussView
- **Machine Learning for Computational Biology**: Sequence classification, host prediction, PyTorch, and SVM, Random Forest, Logistic Regression, k-NN, PCA, clustering, and feature engineering using scikit-learn
- **Programming Languages**: Python, R
- **Operating Systems & Scripting**: Linux, Bash/Shell scripting
- **High-Performance & Cloud Computing**: Microsoft Azure, HPC cluster usage
- **Version Control & Environment Management**: Git, Conda
- **Computational Notebooks & Workflow Documentation**: Jupyter Notebook, Google Colab
- **Documentation & Typesetting**: LaTeX

EXPERIMENTAL SKILLS

- **Molecular Biology Techniques**: Nucleic acid extraction (DNA/RNA), PCR, quantitative PCR (qPCR), gel electrophoresis, and Sanger sequencing
- **Immunological Techniques**: Enzyme-linked immunosorbent assay (ELISA), immunoprecipitation, Western blotting, and immunofluorescence microscopy
- **Protein Analysis & Purification**: SDS-PAGE, Western blotting, affinity chromatography, gel filtration chromatography
- **Microbiology Techniques**: Aseptic techniques, bacterial culture, antibiotic susceptibility testing (disc diffusion, MIC determination)

TRAINING PROGRAMS, HACKATHON, CONFERENCES, WORKSHOPS

- Participated in 40-day training program on “Research Methodology in Molecular Biology and Biotechnology” from the **University of Hyderabad**, Hyderabad, India in 2023
- Completed a one-month online internship program for beginners, focused on applying machine learning fundamentals to develop several models at **Coding Samurai, IT Services and IT Consulting**, Lucknow, India in 2024
- Secured third prize in a 24-hour hackathon on ML and AI "HACK" by the **University of Kerala**, in collaboration with **IEDC**, Kerala, India in 2022, and created a dataset of dental cavities
- Attended a 1-day Workshop on Visual Molecular Dynamics, conducted by the Department of **Computational Biology & Bioinformatics, University of Kerala** in 2022
- Presented a poster at the 7th International Conference on “Sustainable Utilization of Tropical Plant Biomass”, **Department of Computational Biology & Bioinformatics, University of Kerala** in collaboration with **Lund University**, Sweden 2022
- Attended the 8th International Symposium on Computational Biology and Ayurinformatics, **Department of Computational Biology & Bioinformatics**, University of Kerala, in 2021

PUBLICATIONS

Published Articles

Kovath, P. R., Jithenthran, A., N. K., S., V. B., S., P. S., & N. G., V. (2021). Comparative Study on Cultivation of Oyster Mushroom Pleurotus Ostreatus on Different Substrates. *International Journal of Scientific Research and Engineering Development*, 4(3), 1639-1643

Manuscript under review

N. G., V., Prakash, A., S, K., Rajalakshmi, C., Paul, P. M. & Thomas, V. I.
Identifying host-specific patterns in viral protein sequences to predict host spillover risk in animal and plant kingdoms. Manuscript under review at Nature ***Scientific Reports*** (2025).
Github: SPHAK

Manuscript under preparation

Sulay, R., Mathew, J., M, M., Prakash, A., N. G., V. & Ipe Thomas, V. (2024). Comprehensive Investigation on the Degradation Mechanism of Aliphatic Amines with OH Radical: A Computational Study.

OTHER PUBLICATIONS

Authored an article, "Margaret Oakley Dayhoff-A Visionary who pioneered Bioinformatics," Feminium, an inspiring journey of Women in Science, ISBN No 978-93- 91700-362

REFERENCES

1. **Prof. Dr. Achuthsankar S Nair**
   Former head of the department
   Department of Computational Biology and Bioinformatics
   University of Kerala, Trivandrum, Kerala, India
   Email: sankar.achuth@gmail.com
   Google Scholar: link
2. **Dr. Vibin Ipe Thomas**
   Assistant Professor
   Department of Chemistry
   CMS College Kottayam (Autonomous), Kerala, India
   Email: vibin@cmscollege.ac.in
   Google Scholar: link