Arnoneel Sinha, PhD

Post-Doctoral Fellow, CBGM, Augusta University

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Professional Summary

Ph.D.-trained Biostatistician and Postdoctoral Fellow at Augusta University with expertise in bioinformatics, statistical methodology, and data science education. My research bridges methodological development and collaborative applications in multi-omics and translational health data. I have experience leading analytical workflows, mentoring graduate students, and co-authoring NIH and NSF grant proposals. I am passionate about building an independent research program that unites statistical innovation with biomedical discovery while contributing to teaching and mentorship in biostatistics and data science.

Skills

Technical Skills	**Statistical Analysis**: Hypothesis testing, regression analysis, sample size estimation, experimental design, ANOVA, GLM. **Multi-omics Data Analysis**: Analysis of transcriptomics (bulk RNA-seq, scRNA-seq) and proteomics (mass spectrometry); experience with data integration and normalization across platforms. **Single-Cell Analysis**: End-to-end scRNA-seq workflows including QC, normalization, clustering, differential expression, cell type annotation (automated and manual), cell-cell communication (CellChat), and metabolic flux estimation (scFEA). **Bioinformatics Tools**: Proficient in Seurat, DESeq2, Cell Ranger, STAR, HTSeq, Bioconductor, Enrichr, GSEA. **Machine Learning**: Experience with supervised/unsupervised algorithms, time-to-event modeling, changepoint detection, survival analysis. **Data Management**: Handling large-scale biomedical datasets, data cleaning, preprocessing, transformation, integration. **Data Visualization**: Building plots, dashboards, and interactive tools using ggplot2, Shiny, matplotlib, and custom scripts. **Statistical Modeling**: Frequentist and Bayesian approaches, mixed effects models, time series analysis. **Protocol and Analysis Plans**: Designing statistical protocols for studies and grants; experienced in writing statistical analysis plans for collaborative biomedical projects. **High-Performance Computing**: Experience running bioinformatics workflows on HPC systems using SLURM, Linux, and Bash scripting.
Softwares	R (Seurat, DESeq2, ggplot2, Shiny), Python (pandas, sklearn, matplotlib), SAS (macros), LaTeX, Bash
Platforms & Tools	Git/GitHub, Microsoft Office, SLURM, HPC environments, RStudio, Jupyter, VSCode
Languages	English (professional), Hindi, Bengali

Professional Experience

Post-Doctoral Fellow **Aug 2023 - Present**

Dr. Richard McIndoe lab, Center for Biotechnology & Genomic Medicine, Augusta University *Augusta, GA*

- Led analyses of more than 15 scRNA-seq and bulk RNA-seq datasets across multiple biomedical studies, including tumor and pancreatic tissues; developed end-to-end bioinformatics pipelines in R for differential expression, cell type annotation (manual and automated), and pathway enrichment using Seurat, DESeq2, and Loupe Browser
- Collaborated with interdisciplinary investigators to deliver advanced statistical and bioinformatics support using R and Python; co-authored multiple grant proposals (NIH, NSF) and research manuscripts involving scRNA-seq and multi-omics data analysis
- Mentored graduate students in computational genomics projects

Graduate Research Assistant (Teaching Assistant) **Aug 2018 - July 2023**
Augusta University *Augusta, GA*

- Provided statistical consulting on multidisciplinary projects, taught undergraduate math/statistics, and gained expertise in clinical trials with applications of machine learning and advanced modeling.

Senior Subject Matter Expert **Dec 2017 - Mar 2018**
Nerdy Turtlez *Kolkata, India*

- Led and executed data analytics and visualization projects, conducting comprehensive statistical analyses to extract insights.
- Developed customized reports and presentations, creating informative visualizations tailored to client-specific needs.

Research Mentor, Undergraduate Training Program
Statistics Undergraduate Research Experience (SURE), Southern Regional Council on Statistics (SRCOS)

- Mentored undergraduate STEM majors during the SURE Summer Research Conferences (SRCOS 2022 and 2023), providing guidance on graduate school and career opportunities in statistics.
- Collaborated with session leaders to facilitate discussions and address student questions during mentoring sessions.

Teaching Experience

Experienced in teaching and mentoring undergraduate and graduate students in statistics, mathematics, and computational genomics. Instructional philosophy emphasizes reproducible research, applied data analysis, and interdisciplinary learning.

Taught undergraduate and graduate-level courses in statistics, mathematics, and computational genomics in both in-person and hybrid formats. Responsibilities included lecture and slide preparation, grading, office hours, one-on-one mentoring, and collaborative instruction with faculty. Experience spans traditional classroom teaching as well as project-based, hands-on computational training in genomics and bioinformatics.

Graduate Courses:

Co-Instructor, Translational Genomics and Proteomics (GNMD 8051) Spring 2025

- Co-instructed a graduate-level course for 2nd year biomedical students on advanced genomic and proteomic technologies and their applications in translational medicine
- Delivered a lecture on genomic approaches to disease classification and prediction, integrating clinical relevance with computational methods
- Supported students in critical reading of omics literature, project-based assignments, and discussions on emerging genomic tools

Co-Instructor, Computational Methods in Genomics and Genetics (GNMD 8050) Fall 2024, 2025

- Co-taught a 4-credit graduate-level course combining lectures and supervised labs, introducing students to computational and statistical techniques in genomic and genetic research
- Led multiple sessions covering R programming, data visualization, statistical methods, and machine learning techniques including regression, clustering, dimensionality reduction, and neural networks
- Collaborated with faculty to design and evaluate student projects and assessments, and supported hands-on learning through case-based data analysis

Undergraduate Courses:

- **Elementary Statistics (MATH 1401)**
  Hypothesis testing, regression, ANOVA, CLT, etc. Fall 2021
- **Pre-Calculus Mathematics (MATH 1113)**
  Polynomial/exponential functions, trigonometry, unit circle Fall 2020, Spring 2021

Publications & Presentations

Publications

- **Arnoneel Sinha**, Richard A. McIndoe.*cellivista: An Interactive Seurat-Based R Shiny App for Single-Cell RNA-seq Analysis.* (Research article, under preparation)
- Kimberly A. Rivera-Caraballo, Tae Jin Lee, **Arnoneel Sinha**, Marco Orecchioni, Rafal Pacholczyk, Karina Vázquez-Arreguín, Shilpa Sharma, Kimya Jones, Kailash Vemuri, Upasana Sahu, Sara A. Murphy, Bangxing Hong, Ravindra Kolhe, Ashok Sharma, Balveen Kaur; Oncolytic HSV-1-Mediated JAG1 Blockade Induces Glioma Senescence-Associated Secretory Phenotype to Increase Macrophage Activation and Cetuximab-Mediated Senolysis. Cancer Res 2025; https://doi.org/10.1158/0008-5472.CAN-25-1402
- **Sinha A**, Chen J. *On the Detection of Multiple Change Points in a Sequence of Bivariate Normal Random Vectors with Application to COVID-19 Data.* (Research article, under review)
- **Sinha A**, Chen J. *On the Detection of Multiple Change Points in a Sequence of Bivariate Negative Binomial Random Vectors with Application to COVID-19 Data.* (Research article, under preparation)
- James JN, Frazier KB, Looney SW, **Sinha A**, Faigen AB. *Does a Difference Exists in Comprehensive Basic Science Examination Scores of 4-Year versus 6-Year Oral-Maxillofacial Surgery Residents?* J Oral Maxillofac Surg. 2020 Sep;78(9):1459.e1-1459.e6. doi: 10.1016/j.joms.2020.04.007. Epub 2020 Apr 18. PMID: 32413336.

Presentations

- **Arnoneel Sinha**, Richard A. McIndoe.*cellivista: An Interactive Seurat-Based R Shiny App for Single-Cell RNA-seq Analysis.* **Health Sciences Fair and Expo**, Augusta University, GA, 2025. (Poster presentation)
- **Arnoneel Sinha**, Jie Chen. *Detecting Multiple Change Points in Bivariate Negative Binomial Model with Application to COVID-19 Incidence and Death Counts.* **Summer Research Conference, Southern Regional Council on Statistics**, Waco, TX, 2023. (Poster presentation)
- **Arnoneel Sinha**, Jie Chen. *Detecting Multiple Change Points in Bivariate Negative Binomial Model with Application to COVID-19 Incidence and Death Counts.* **The 3rd Annual Workshop: Emerging Data Science Methods for Complex Biomedical and Cyber Data**, Augusta University, Augusta, GA 2023. (5 minute presentation)
- **Arnoneel Sinha**, Jie Chen. *Detection of Multiple Change Points in Bivariate Data: Application to COVID-19 Incidence and Death Rates.* **Summer Research Conference, Southern Regional Council on Statistics**, Jekyll Island, GA, 2022. (Poster presentation)

Education

Doctor of Philosophy (Biostatistics) **Aug 2018 - July 2023**
Augusta University

Dissertation Title: On the Detection of Multiple Change Points in A Sequence of Bivariate Random Vectors with Application to COVID-19 Data

Master of Science (Statistics) **2015 - 2017**
Visva Bharati University

Thesis Title: An overview of Process Capability Analysis

Bachelor of Science (Statistics) **2012 - 2015**
Visva Bharati University

Thesis Title: Juvenile Apprehension in India (2001-2012): A Statistical Perspective

Academic Projects & Theses

Selected Academic Projects & Theses

- **A Review on Gene Set Analysis**
  'Omics Data Analysis' course final project
- **A Comparison of Five Machine Learning Techniques Predicting Time to Failure in Laboratory Earthquakes**
  'Statistical and Machine Learning for Big Data' course final project
- **An overview of Process Capability Analysis**
  Masters' Thesis
- **Juvenile Apprehension in India (2001-2012): A Statistical Perspective**
  Bachelor's Thesis

Current Projects

- Downstream Single Cell RNA-Seq Data Analysis with RShiny: A User-Friendly Tool for Biologists
- Comparison of Existing and LLM-based Automated Cell Type Annotation Methods for Single-Cell RNA-Seq Data

Awards & Honors

- Winner of '*People's Choice Award*' in the 3MT competition at Augusta University (03/29/2023)
- '*NSF Travel Award*' winner at the 3rd Annual Data Science Workshop, Augusta University (03/17/2023)
- '*Outstanding Student of the Year*' award at Biostatistics & Data Science Division, Augusta University (2021-2022)
- '*Boyd Harshburger Travel Award*' winner at the Summer Research Conference, SRCOS (10/04/2022)
- Member of the *Augusta University Post-Doctoral Association*, Augusta University (Fall 2024 - Present)
- Member of the *Student Advisory Council*, Enrollment & Student Affairs, Augusta University (Fall 2024 - Present)
- Member of the *Graduate Student Council* (GSC), Augusta University (Fall 2021 - Summer 2023)
- GSC representative on the *The Graduate School - Faculty Council*, Augusta University (Fall 2022 - Summer 2023)

Training / Certificates

One year Master of Business Administration (MBA) **2017**
National Institute of Business Management (NIBM)
Specialization: Market Research

Business Analytics training course **2017**
CONCEPTlytics Institute & Technologies