

Raymond Lesiyon

Aurora Colorado -80011

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Research interests

Areas: Computational Biology, Network Analysis, Knowledge Graphs, Natural Language Processing (NLP), Large Language Models (LLM), Protein Language Models

Education

Michigan State University

M.Sc. in Computational Math Science and Engineering (CMSE), GPA - 3.94

East Lansing, MI

Aug 2021 – May 2023

- **Coursework:** Mathematical Foundation for Data Science, Numerical Linear Algebra, Data Mining, Statistical Genetics, Genomic Data Handling: Unix and Python, Genomics and Sequencing Analysis, RNA-Seq Data Analysis

Michigan State University

B.Sc. in Biosystems Engineering — Minor in CMSE, GPA - 3.92

East Lansing, MI

Aug 2017 – May 2021

- Graduated Magna Cum Laude
- MasterCard Foundation Scholar Program Recipient
- Dean's Honors List : Fall 2021 – Spring 2021
- MasterCard Foundation (MCF) Scholar Program Recipient, 2017
- **Coursework:** Bioinformatics and Computational Biology, Methods for Parallel Computing, Medical Microbiology

Research experience

Informatics Research Professional

UNIVERSITY OF COLORADO, ANSCHUTZ

Aug 2023 – Present

Aurora, CO

Labs: **JRaviLab**, Department of Biomedical Informatics — CU Anschutz, **Wale Lab**, Microbiology and Molecular Genetics and Integrative Biology — MSU

Mentors: Dr. Janani Ravi, Dr. Nina Wale

Project 1: Evolution of bacterial traits in relation to its host association and pathogenicity

- Optimized phylogenetic regression analysis with modular R code, speeding up 200+ model iterations and improving insights into bacterial traits and pathogenicity.
- Applied Akaike Information Criterion (AIC) for model selection improving accuracy, and reliability of evolutionary biology research.

Project 2: MicroGenomeR an R data package for aggregating microbial phenotypic, and genotypic trait.

- Adapted Austraits multiple datasets integration pipeline to effectively harmonize 26+ microbial datasets into a central source with consistent units and trait values.
- Enabled efficient storing, and loading of microbial traits data at strain and species levels using memory-optimized file format: parquet and RDA.

Technical Aide

MICHIGAN STATE UNIVERSITY

Jun – Aug 2021

East Lansing, MI

Labs: **Juan Steibel Lab**, Department of Animal Science, MSU

Mentor: Dr. Juan Steibel

Project: Hyperparameter tuning for Long short-term memory (LSTM), model trained on Detecting Agonistic Behavior of Pigs in a Single-Space

- Leveraged Slurm workload manager for running LSTM deep learning algorithms on high-performance computing clusters, achieving optimized resource utilization and computational efficiency.
- Performed hyper-parameters tuning for LSTM model enhancing model performance on classifying agonistic pig's behaviors.

Biosensor Intern
FRAUNHOFER USA INC.
Mentor: Dr. Suzanne Witt

Jun 2019 – Aug 2020
East Lansing, MI

Project: Immobilizing antibodies into Boron-doped diamond surface for detecting COVID-19 spike protein

- Designed and implemented a data visualization dashboard with Tkinter and Pandas, streamlining the analysis of data from 37 biosensor fabrication experiments and enhancing decision-making.
- Functionalized antibody biosensors on boron-doped diamond surfaces using N-hydroxysuccinimide(NHS) techniques, and tested their ability to detect COVID-19 spike protein through electrochemical impedance measurements.

Undergraduate Research Assistant

Jun 2019 – Aug 2020
East Lansing, MI

MICHIGAN STATE UNIVERSITY

Labs: MIDI Lab, Department of Biomedical Engineering, MSU

Mentor: Dr. Adam Alessio

Project: Classification of ovarian torsion using machine learning with radiological features

- Performed ovarian torsion classification with radiological features using decision trees classifiers, random trees, and logistic regression through Sci-kit learn
- Employed ROC curve, accuracy, specificity, and sensitivity metrics to evaluate models performance on ovarian torsion.

Undergraduate Research Assistant

Summer 2018
East Lansing, MI

MICHIGAN STATE UNIVERSITY

Labs: Harada Lab, Department of Biomedical Engineering, MSU

Mentor: Dr. Masako Harada

- Design primers with blast tools, and clone desired gene using Seamless Ligation Extract (SLiCE) method

Industry experience

Software Development Intern

May – Aug 2022
Seattle, WA

AMAZON

Project: Developing a central messaging single page application, consolidating messages from different pages

- Collaborated with teams to design a strategic integration plan, built a React/TypeScript single-page app to improve user experience.

Skills

Programming languages: Python, R, Matlab, C++

Computational tools: Unix/Linux, Git, High-performance computing clusters

Methodologies: Dimensional reduction - Principal Component Analysis(PCA), data analysis and visualization — tidyverse, ggplot, pandas

Machine learning: Linear and Logistic regression, Support Vectors, K-means

Deep learning: Neural networks, Transformers — BERT, BioBERT

NLP: Term Frequency Inverse Document Frequency (TF-IDF), Text-embedding, LLM

Publications

1. Nina Wale*, **Raymond Lesiyon***, Clay Cressler, Janani Ravi. *Are bacterial (pathogens) special?*. Manuscript in preparation
2. **Raymond Lesiyon**, Janani Ravi. *MicroGenomeR: An R data package for integrating and harmonizing microbial data from various data sources*. Manuscript in preparation
3. Junjie Jan, Janice Siegford, Dirk Colbry, **Raymond Lesiyon**, Anna Bosgraaf, Chen Chen, Tomas Norton, Juan Steibel. *Evaluation of Computer Vision for Detecting Agonistic Behaviour of pigs in a Single-Space Feeding Stall Through Blocked Cross-Validation Strategies*. 10.2139/ssrn.4098711
4. Suzanne T Witt, Alexis Rogien, Diana Weiner, James R Siegenthaler, **Raymond Lesiyon**, Noelle Kurien,

Robert Rechenberg, Nina Baule, Aaron Hardy, Michael Becker. *Boron doped diamond thin films for the electrochemical detection of SARS-CoV-2 S1 Protein*. 10.1016/j.diamond.2021.108542

Presentation

Research and Technical Talks.....

- **July, 24: Bioc2024 International Conference**, MicroGenomeR an R data package for aggregating microbial phenotypic, and genotypic trait. Val Andel Institute, Grand Rapids Michigan

Posters.....

- **Aug, 24: CU Anschutz Department of Biomedical Informatics Retreat**, Are (bacterial) pathogens special? Aurora, CO
- **June, 24: Quantitative Cell and Molecular Biology Symposium**, Are (bacterial) pathogens special? Colorado State University, Fort Collins, CO
- **April, 24: American Society of Microbiology Rocky Mountain Branch**, Are (bacterial) pathogens special? University of Colorado Boulder, Boulder, CO
- **Aug, 20: Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE)**, Ovarian torsion identification using machine learning, Michigan State University, East Lansing, MI

Teaching experience

Graduate Teaching Assistant

Aug 2021 – May 2023

MICHIGAN STATE UNIVERSITY, *Dept. of Computational Math Science and Eng.*

East Lansing, MI

CMSE 802: Methods in Computational Modeling

CMSE 202: Computational Modelling and Data Analysis II

Academic Tutor

Jan 2019 – Aug 2021

MICHIGAN STATE UNIVERSITY, *College of Engineering*

East Lansing, MI

- Tutored STEM students in calculus and physics, providing guidance and support in their coursework

Service and Leadership

Educational Support Initiative

Aug 2023

KOKWA ISLAND PRIMARY SCHOOL

Baringo, Kenya

- Led a school uniform donation initiative to provide uniform to 11 students from orphaned or low-income families, enhancing their access to education.

Academic Core Lead Tutor

Aug 2020 – May 2021

MICHIGAN STATE UNIVERSITY, *Dept. of Computational Math Science and Eng.*

East Lansing, MI

- Guided tutors for smooth tutoring center operations and organized STEM review sessions to prepare students for exams.

International Orientation Leader

Aug 2018

MICHIGAN STATE UNIVERSITY, *Office of International Students*

East Lansing, MI

- Guided a group of 10 international students throughout their first week of enrolling at MSU

Maji Safi ni Uhai Initiative

Oct 2019

KAPKURES COMMUNITY

Bomet, Kenya

- Co-founderd Maji Safi ni Uhai Initiative, and secured \$4000 from MCF program to drill water kapkures community in Bomet, Kenya

Simbolei Project

Sep 2017

Rural books cataloging

East Lansing, MI

- Helped in cataloging books to be sent to rural library in Kenya

Community Need Assessment Leader

BARINGO SOUTH

Mar – May 2017

Baringo, Kenya

- Lead a group of 10 students from Education and Social Empowerment Program(EaSEP) conduct community need assessment in Ilchamus community

Volunteer Teacher

KOKWA PRIMARY SCHOOL

Jan – June 2016

Baringo, Kenya

- Volunteered to teach STEM classes to grade eight students

Community Need Assessment Guide

KOKWA ISLAND

Jan 2016

Baringo, Kenya

- Assisted in community need assesment in Kokwa Island with Friends of Kenya Schools and Wildlife (FKSW) by activating as a translator

Awards

- MSU Explore Computational Research Experience (ECRE), 2021
- MasterCard Foundation (MCF) Scholar Program Recipient, 2017