

# Raymond Lesiyon

Aurora Colorado -80011

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## Research interests

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

## Education

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### 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

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### 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

MICHIGAN STATE UNIVERSITY

Labs: MIDI Lab, Department of Biomedical Engineering, MSU

Jun 2019 – Aug 2020

East Lansing, MI

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.

## Industry experience

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### Software Development Intern

AMAZON

May – Aug 2022

Seattle, WA

**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

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**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

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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

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### 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

## Teaching experience

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### 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

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### 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

### Community Need Assessment Leader

**Mar – May 2017**

BARINGO SOUTH

*Baringo, Kenya*

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

### Volunteer Teacher

**Jan – June 2016**

KOKWA PRIMARY SCHOOL

*Baringo, Kenya*

- Volunteered to teach STEM classes to grade eight students

### Community Need Assessment Guide

**Jan 2016**

KOKWA ISLAND

*Baringo, Kenya*

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