

Abhishek Mallela

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SUMMARY

Research scientist with over 10 years of experience in modeling and computation across various biological subfields. Expert in TensorFlow, JAX, and Python, with a strong background in deep learning and mathematical modeling. Eager to contribute to innovative projects in modeling and machine learning.

EDUCATION

Applied Math, PhD, Mar '22; GPA: 3.74

University of California at Davis, Davis, CA

Applied Stats and Analytics, MS, May '17; GPA: 3.90

University of Kansas Medical Center, Kansas City, KS

Math and Stats, MS, May '15; BS, Dec '11; GPA: 4.00; 3.81

University of Missouri at Kansas City, Kansas City, MO

SKILLS

- Programming: Python, MATLAB, R, Julia, LaTeX, Mathematica, basic C++, and shell scripting
- AI/ML: Automatic differentiation; Completed Deep Learning, Natural Language Processing, and Foundations of Algorithms and Data Structures specializations (Coursera)
- Data: Pre- and post-processing of COVID-19 surveillance data across all US counties and county equivalents
- Communication: 14 publications in peer-reviewed journals, 5 invited talks, 9 contributed talks and posters, cross-disciplinary expertise, and proficiency in technical writing

EXPERIENCE

- *Postdoctoral Fellow (Lab of Santiago Schnell at University of Notre Dame and Dartmouth College; Feb '25 to present)*
 - **Modeling:** Designing and estimating the parameters of enzyme-catalyzed experiments and designing a mathematical model of a minimal mechanism for hormesis in protein aggregation.
 - **AI/ML:** Collaborating with researchers at Harvard University on an effort involving repeated games with LLMs.
- *Postdoctoral Fellow (Center for Nonlinear Studies at Los Alamos National Laboratory; May '22 to Jan '25)*
 - **Modeling:** Estimated the basic reproduction number for COVID-19 in 50 US states and 280 urban areas, identifying regions at risk of high disease transmission and aiding future pandemic preparedness. *Techniques used: Bayesian inference, Adaptive MCMC algorithm, and convergence diagnostics.*
 - **Collaboration:** Contributed significantly to the collective efforts of a large consortium of COVID-19 researchers.
 - **Software:** Python (NumPy, SciPy, Jax, Diffrax, Pandas, Jupyter Notebook, Keras, TensorFlow, Numba); Julia
 - **Achievements:** 8 peer-reviewed publications (3 as first-author), 2 international conference talks, 3 invited talks, 1 local poster presentation.
- *PhD Candidate, Graduate Teaching Assistant, and Tutor (University of California at Davis; Sep '17 to Mar '22)*
 - **Modeling:** Explored the stochastic aspects of coupled bistable systems arising from the Allee effect in ecology. Found that changing one parameter in multi-dimensional systems can result in tipping point cascades, common in many fields and across spatial scales. *Techniques used: Stochastic Differential Equations, Individual-Based Models, Fourier transforms, Partially Observable Markov Decision Processes*
 - **Achievements:** PhD degree with 3 first-author publications, TA and tutor for several math courses.
- *Graduate Research Associate (University of Kansas; Oct '15 to Sep '17)*
 - **Modeling:** Developed mathematical models to analyze a) post-translational modification cycles subject to synthesis and degradation, and b) length control of bacterial structure assembly. Used an agent-based framework based on the stochastic Doob-Gillespie algorithm to efficiently simulate the models numerically on a computer cluster. Achieved a 100x speedup by switching from MATLAB to Python and then C++.
 - **Software:** MATLAB, Python, C++, Kappa, BNGL, R, Mathematica
 - **Achievements:** 2 peer-reviewed publications (1 as first-author), 2 local poster presentations.
- *Graduate Student Researcher and Course Instructor (University of Missouri at Kansas City; Aug '13 to May '15)*
 - **Modeling:** Designed, analyzed, and simulated an ODE model of HIV-TB co-infection. Formulated and solved an optimal control problem to simultaneously minimize disease burden and implementation cost.
 - **Collaboration:** Led project with research supervisor and external collaborator, a world-class expert in optimal control theory, to design an optimal treatment protocol for HIV-TB co-infected populations.
 - **Achievements:** 1 first-author publication, 1 first-place poster prize (500 USD), 2 international conference talks, 3 invited talks, Adjunct Instructor of Record (Trigonometry and College Algebra).