Sameerah Helal

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Education

University of California, Davis	**Computer Science** | GPA 4.0	**Ph.D.**	2026 expected
	Applied Mathematics, Statistics	**B.S.**	2021

Publications

Sameerah Helal, Zhe Tao, Cindy Rubio-González, Francois Gygi, and Aditya V. Thakur (2024). "Towards Verifying Exact Conditions for Implementations of Density Functional Approximations". In proceedings of *Correctness 2024: Eighth International Workshop on Software Correctness for HPC Applications.*

Experience & Research

Automated Reasoning Group, *University of California, Davis* \| Graduate Research Assistant
Sep 2022 – present

- Conduct research in formal methods and machine learning. Recent work applies formal methods to widely-used scientific HPC software, improving reliability and correctness over SOTA.

  Verifying Exact Conditions of Density Functional Approximations \| 2024

  Developed XCVERIFIER, the first tool that *provably* verifies conditions of popular density functional theory approximations. Designed and implemented an algorithm that significantly improved efficiency and success rate of verification.

- Created a novel algorithm for attributing training data in generative AI (diffusion) models.

Computer Science Department, *University of California, Davis* \| Teaching Assistant
Mar 2024 – Jun 2024

- Evaluated assignments for a graduate-level formal methods/advanced programming languages course. Improved student understanding of material via office hours. Covered lectures ad hoc.

Statistics Department, *University of California, Davis* \| Undergraduate Research Assistant
Jun 2021 – Jun 2022

- Conducted research on methods of using machine learning techniques to perform topology-preserving dimension reduction of point clouds. Designed domain-specific loss functions and training algorithm for improved performance.

Mathematics Department, *University of California, Davis* \| Undergraduate Research Assistant
Jan 2020 – Dec 2021

- Improved performance of whale migration simulator by at least 60% and up to 100% when using spatio-temporally coarse input data. Presented in B.S. thesis and at University of California, Davis Mathematics Undergraduate Research Conference.

Skills

Programming languages — Python, R, MATLAB, SQL, JavaScript, Shell Scripting
Tools and frameworks — PyTorch, TensorFlow, scikit-learn, pandas; SymPy, dReal, Z3; git