# Connor Robertson

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## Education

**PhD - Applied Mathematics** *2018 - 2023*
New Jersey Institute of Technology

**BS - Applied and Computational Mathematics** *2011 - 2018*
Brigham Young University

## Experience

**Postdoctoral Researcher** *2023 - Present*
Sandia National Laboratories *Livermore, CA*

Bayesian and variational inference for agent-based epidemic models to enhance predictive accuracy in forecasting and quantify uncertainty. Aligned large computational models run on cloud supercomputing clusters with COVID-19 observations using random forests and gaussian processes. Also included time series analysis, neural network based forecasting, clustering, Markov chain monte carlo, and Stein variational inference.

**Doctoral Researcher** *2019 - 2023*
New Jersey Institute of Technology *Newark, NJ*

Machine learned complex systems modeling with multivariate symbolic regression. Extracted the causal partial differential equation of a complex fluid system directly from video experiments. Included video and image processing, feature generation, sparse regression, modeling, and predictive simulation.

**Graduate Student Research Awardee** *2021 - 2022*
Oak Ridge National Laboratory (SCGSR) *Remote*

Forecasted bacterial growth and interactions with recurrent neural networks. Modified video frame prediction network to predict population and colony growth of mutant bacterial strains. Included video and image processing, and time series forecasting with recurrent neural networks.

**Co-founder** *2018*
Coventina LLC. *Provo, UT*

Forecasted probable water main breaks across water distribution networks in Utah County. Included developing data pipeline to scraping from internal and external sources and to clean and impute data in imbalanced dataset ensuring data quality and integrity. Developed machine learning toolkit for regression and tree-based modeling using physical and data-driven features. Automated report generation to effectively display probabilistic forecasts on networks and to concisely deliver insights for non-technical stakeholders.

**Project Assistant** *2016 - 2018*
Brigham Young University *Provo, UT*

Used network theory for operations research and statistical modeling to optimize water infrastructure expansion in developing countries. Wrote and edited programming assignments in data science and numerical computing including: web scraping, noSQL, optimization, and linear algebra. Managed lab of Red Hat Linux computers.

## Qualifications and Skills

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|---|---|
| Programming Languages | **Python**, **Julia**, R, SQL, Matlab, Mathematica, C++ |
| Libraries | numpy, scipy, matplotlib, pandas, scikit-learn, jax, pytorch, xgboost, scikit-image |
| Open Source Contributions | **TidierPlots.jl, TidierData.jl** - implementation of R packages ggplot2, dplyr in Julia |
| Spoken Languages | **English**, Spanish |

## Honors

2023 **Outstanding Graduate Student Award,** College of Science and Liberal Arts - NJIT

2023 **Chair: Machine Learning & Optimization Seminar,** Department of Mathematical Sciences - NJIT

2023 **DSECOP Fellow,** Data Science Education Community of Practice - APS

2021 **Ahluwalia Doctoral Fellowship,** Deparment of Mathematical Sciences - NJIT

2020 **(Honorable mention) Graduate Research Fellowship Program,** National Science Foundation

# Conferences

## Talks

**Bayesian Calibration of Stochastic Agent Based Model via PCA Based Surrogate Modeling** *2024*
SIAM Conference on Uncertainty Quantification *Trieste, Italy*

**Data-driven continuum modeling of active nematics via sparse identification of nonlinear dynamics** *2023*
SIAM Conference on Computational Science and Engineering *Amsterdam, Netherlands*

**Data-driven continuum modeling of active nematics via sparse identification of nonlinear dynamics** *2022*
Annual Meeting of the APS Division of Fluid Dynamics (APS DFD) *Indianapolis, Indiana*

**Data-driven continuum modeling of active nematics via sparse identification of nonlinear dynamics** *2022*
Annual Meeting of the American Physical Society (APS March) *Chicago, Illinois*

**Neural networks for function approximation and data-driven modeling** *2021*
Machine Learning and Optimization Seminar - Department of Mathematical Sciences NJIT *Newark, New Jersey*

**Facility location using Markov chains** *2018*
CPMS Student Research Conference - Brigham Young University *Provo, Utah*

**Efficiency of Water Distribution in Water Poor Areas of the World** *2017*
Student Days - SIAM Annual Meeting *Pittsburgh, Pennsylvania*

## Posters

**Data-driven discovery of PDEs for active nematic systems** *2022*
National Academy of Inventors - NJIT Chapter Workshop *Newark, New Jersey*

**Discovering governing equations of an active nematic system using PDE-Find** *2020*
GAMM Juniors' Summer School *(virtual) Magdeburg, Germany*

**Aligning Self-Propelling Particles in Non-trivial Domains** *2019*
Frontiers in Applied and Computational Mathematics *Newark, New Jersey*

## Organization

**Department of Mathematical Sciences - NJIT** *2022 - 2023*
Machine Learning and Optimization Seminar Chair *Newark, New Jersey*
https://cnrrobertson.github.io/other/mlseminar/mlseminar.html

# Publications

**Performing Video Frame Prediction of Microbial Growth with a Recurrent Neural Network** *2023*
Frontiers in Microbiology: Systems Microbiology *Click to open*

**Investigating the growth of an engineered strain of Cyanobacteria with an Agent-Based Model and a Recurrent Neural Network** *2021*
bioRxiv *Click to open*

**Using Survey Data and Mathematical Modeling to Prioritize Water Interventions in Developing Countries** *2021*
Water Resource Management *Click to open*

# Professional Associations

**Society for Industrial and Applied Mathematics** *2017 - Present*

**American Physical Society** *2022 - 2024*