

Connor Robertson

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Education

PhD - Applied Mathematics

August 2018 - Present

New Jersey Institute of Technology

B.S. - Applied and Computational Mathematics

August 2011 - May 2018

Brigham Young University

Research Experience

Discovering governing equations for active nematics from data

September '19 - Present

Research Assistant - New Jersey Institute of Technology - Newark, New Jersey

Advisors: Travis Askham, Anand Oza

Discovering the governing partial differential equation of an active nematic system from experimental video. Topics include image processing, numerical differentiation of noisy data, sparse regression, and continuum models of active nematic and liquid crystal systems.

Modeling two-species bacteria interaction via recurrent neural networks

September '19 - Present

Research Award - Oak Ridge National Laboratory - Oak Ridge, Tennessee

Mentor: Miguel Fuentes-Cabrera

Using images of mutant and natural bacterial strains from the researchers at Oak Ridge National Lab, adjusted PredRNN architecture to model and predict population and colony growth. Focus on image processing, neural network architecture, and accelerating agent-based modeling approaches

Forecasting water main breaks from data

March '18 - December '18

Cofounder - Coventina LLC - Provo, Utah

Developed statistics and machine learning toolkit used to forecast water main breaks for public works departments. Research and development comprised of data collection, cleaning, imputation, regression analysis, model building and validating

Determining optimal new facility location via network theory

March '17 - May '18

Research Assistant - Brigham Young University - Provo, Utah

Undergraduate research team focused on applying new mathematical concepts to problems in society and industry. Projects include: Use of network theory and Markov Chains for facility location problems in operations research and utilizing data science tools in optimizing improvements in water access in developing countries

Developing computational math curriculum

September '17 - May '18

Project Assistant - Brigham Young University - Provo, Utah

Editing and writing academic programming assignments in Python and managing lab computer and servers. Assignments include curriculum on: Web Scraping, Serialization, NoSQL DBMS, parallel processing techniques, quasi-newton optimization, and numerical Arnoldi method for eigenvalue and eigenvector computation

Conference Participation

Poster: Discovering governing equation of an active nematic system using PDE-Find GAMM Juniors' Summer School - Magdeburg, Germany	August 2020
Poster: Aligning Self-Propelling Particles in Non-Trivial Domains Frontiers in Applied and Computational Mathematics - Newark, New Jersey	May 2019
Talk: Facility location using Markov chains CPMS Student Research Conference - Brigham Young University - Provo, Utah	March 2018
Talk: Efficiency of Water Distribution in Water Poor Areas of the World Student Days - SIAM Annual Meeting - Pittsburgh, Pennsylvania	July 2017

Honors and Awards

Graduate Student Research Award (SCGSR) - Department of Energy	2021
Ahluwalia Doctoral Fellowship - Department of Mathematical Sciences (NJIT)	2021
Honorable mention - NSF Graduate Research Fellowship Program	2020

Teaching Experience

Teaching Assistant - New Jersey Institute of Technology - Newark, New Jersey
Math 111, 238 - Calculus
Math 340, 391 - Numerical Methods and Linear Algebra
Math 631 - Graduate Linear Algebra

Professional Associations

Member - Society for Industrial and Applied Mathematics (SIAM)	2017 - Present
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Qualifications and Skills

Programming

In order of experience: Python, Julia, Matlab, C++, Mathematica, HTML/CSS

Educational projects include: noisy differentiation methods, sparse basis pursuit and regression, facial recognition, signal processing with Fourier transforms, markov chains for NLP, optimization (Simplex Method, Newton's Method, etc.), data processing tools, implementation of numerical solvers for ODEs, PDEs, and various applications of machine learning algorithms

Language

English (native)
Spanish (fluent)

Publications

Investigating the growth of an engineered strain of Cyanobacteria with an Agent-Based Model and a Recurrent Neural Network. bioRxiv (2021). <https://doi.org/10.1101/2021.10.11.463942>

Using Survey Data and Mathematical Modeling to Prioritize Water Interventions in Developing Countries. Water Resource Management (2021). <https://doi.org/10.1007/s11269-020-02761-8>