Aminur Rahman

Department of Applied Mathematics
University of Washington
arahman2@uw.edu

https://faculty.washington.edu/arahman2
YouTube: Amin Rahman @UW
amin.appliedmath@gmail.com

Research Interests	Dynamical Systems, Nonlinear dynamics and Chaos, Bifurcation Theory, Partial Differential Equations, Physical Applied Math, Fluid Dynamics, Mathematical Biology.

EDUCATION

May 2017 — **Ph.D. in Applied Mathematics**, *New Jersey Institute of Technology & Rutgers University, Department of Mathematical Sciences*, Newark, NJ
Advisor: Denis Blackmore.
Dissertation: *Qualitative Modeling and Analysis of Chaotic Logical Circuits and Walking Droplets: A Dynamical Systems Approach*

PROFESSIONAL APPOINTMENTS

9/16/24 - Present — **Senior Scientist**, *ReynKo (Reynolds-Kolmogorov), Inc.*, Brooklyn, NY

9/1/20 - 9/15/24 — **Instructor (with PI status)**, *University of Washington*, Seattle, WA

6/1/22 - 9/15/24 — **AI Institute in Dynamic Systems Researcher**, *University of Washington*, Seattle, WA
Director: J. Nathan Kutz

9/1/17 - 8/31/20 — **Postdoctoral Teaching and Research Scholar**, *Texas Tech University*, Lubbock, TX
Mentors: Souparno Ghosh and Ranadip Pal

6/1/08 - 8/8/08 — **Lee Teng Particle Accelerator Physics Undergraduate Internship**, *Argonne National Laboratory, University of Chicago*, Argonne, IL
Mentor: Nicholas Sereno

HONORS AND AWARDS

2023	UW AMATH Boeing Excellence in Research and Teaching Award
2022	Third-prize in the Northwestern QBio Great Math Challenges proposal competition
2021	First-prize in the APS Forum for Early Career Scientists poster award
2020	Runner-up in the APS Group on Statistical and Nonlinear Physics Postdoctoral speaker award
2016	New Jersey Institute of Technology Excellence in Teaching
2013	Runner-up in the SIAM dsweb pedagogy contest

Early career travel awards — SIAM-DS 2021 and 2015, APS Braslau Family Grant: APS-March 2021, Dynamic Days 2018 and 2019, AMS Sectional-Fall 2016, NJIT student travel award 2013-2015

COMPETITIVE FUNDING

2021-2024 — American Mathematical Society - Simons Foundation Travel Grant

PUBLICATIONS

Key: Underline – corresponding author; g, ug, hs – mentoring (graduate student, undergraduate, high school); ▶ – highlighted publication

SUBMITTED

30) K. Owens[g,pd], A. Rahman, I. Bozic. Spatiotemporal dynamics of tumor - CAR T cell interaction following local administration in solid cancers. (Submitted, preliminary version on biorxiv: https://www.biorxiv.org/content/10.1101/2024.08.29.610392v1)

29) A. Rahman. Towards a Deterministic Interpretation of Quantum Mechanics: Insights from Dynamical Systems. (Under review, preliminary version on arxiv: https://arxiv.org/abs/2405.00707)

28) J. N. Kutz, A. Rahman, M. Ebers[g], J. Koch, J. Bramburger. Universal Dynamics of Damped-Driven Systems: The Logistic Map as a Normal Form for Energy Balance. (Submitted, preliminary version on arxiv: https://arxiv.org/abs/2211.11748)

27) A. Rahman, A. Peace, R. Kesawan[g], S. Ghosh. Spatio-temporal models of infectious disease with high rates of asymptomatic transmission (Submitted, preliminary version on arxiv: `https://arxiv.org/abs/2207.09671`)

REFEREED JOURNALS

26 A. Rahman, T. Rosato. Introduction to the special issue in memoriam of Denis Blackmore. *Mech. Res. Commun.* **134** (to appear).

▶ 25) A. Rahman. Damped-driven system of bouncing droplets leading to deterministic diffusive behavior. *Phys. Rev. E* **108** 035103 (2023); DOI: 10.1103/PhysRevE.108.035103

▶ 24) A. Rahman, D. Blackmore. The One-dimensional Version of Peixoto's Structural Stability Theorem: A Calculus-based Proof. *SIAM Review* **65**(3) (2023); DOI: 10.1137/21M1426572. **Cover Article**

23) G. Ferrandez-Quinto[ug], A. Rahman. Stochastic discrete dynamical model for the hydrodynamic analog of a quantum mirage. *Mech. Res. Commun.* **134** 104219 (2023); DOI: 10.1016/j.mechrescom.2023.104219. *Invited Special Issue in honor of Denis Blackmore*

▶ 22) E. Kara, G. Zhang[ug], J. J. Williams[g], G. Ferrandez-Quinto[ug], L. J. Rhoden[ug], M. Kim[ug], J. N. Kutz, A. Rahman. Deep Learning Based Object Tracking in Walking Droplet and Granular Intruder Experiments. *J. Real-Time Image Pr.* **20** 86 (2023); DOI: 10.1007/s11554-023-01341-4

21) G. Zhang[ug], I. C. Christov, A. Rahman. Multi-bounce resonances in the interaction of walking droplets. *Mech. Res. Commun.* **134** 104215 (2023); DOI: 10.1016/j.mechrescom.2023.104215. *Invited Special Issue in honor of Denis Blackmore*

20) A. Rahman, J. N. Kutz. Walking Droplets as a Damped-driven System *SIAM J. Appl. Dyn. Syst.* **22**(2) (2023); DOI: 10.1137/22M1486042.

19) K. Murthy[hs], I. Jordan[ug], P. Sojitra[ug], A. Rahman, D. Blackmore. Generalized Attracting Horseshoe in the Rössler Attractor. *Symmetry* **13**(1), 30 (2021); DOI: 10.3390/sym13010030. Invited special issue on Symmetry in Modeling and Analysis of Dynamic Systems.

▶ 18) A. Rahman, D. Blackmore. Walking Droplets Through the Lens of Dynamical Systems. *Modern Physics Letters B* **34**(34) 2030009 (2020); DOI: 10.1142/S0217984920300094. Invited *World Scientific* review article.

▶ 17) E. Kara[g], A. Rahman, E. Aulisa, S. Ghosh. Tumor ablation due to inhomogeneous – anisotropic diffusion in generic 3-dimensional topologies. *Physical Review E* **102** 062425 (2020); DOI: 10.1103/PhysRevE.102.062425. *UT Austin Center for Computational Oncology paper of the week.*

16) A. Rahman, D. Blackmore. Interesting bifurcations inspired by walking droplet dynamics. *Communications in Nonlinear Science and Numerical Simulations* **90** 105348 (2020); DOI: 10.1016/j.cnsns.2020.105348.

15) S.R. Dhruba, A. Rahman, R. Rahman, S. Ghosh, R. Pal. Recursive model for dose-time responses in pharmacological studies. *BMC Bioinformatics* **20**(Suppl 12):317 (2019); DOI: 10.1186/s12859-019-2831-4. Invited special issue on Computational Network Biology: Modeling, Analysis, and Control.

▶ 14) A. Rahman, S. Ghosh, R. Pal. Modeling of drug diffusion in a solid tumor leading to tumor cell death. *Physical Review E* **98** 062408 (2018); DOI: 10.1103/PhysRevE.98.062408.

▶ 13) A. Rahman. Standard map-like models for single and multiple walkers in an annular cavity. *Chaos* **28**(9) 096102 (2018); DOI: 10.1063/1.5033949. Invited special issue on Hydrodynamic Quantum Analogs.

▶ 12) A. Rahman, I. Jordan[ug], D. Blackmore. Qualitative models and experimental investigation of chaotic NOR gates and set/reset flip-flops. *Proceedings of the Royal Society A* **474** 1-19 (2018); DOI: 10.1098/rspa.2017.0111

▶ 11) A. Rahman, Y. Joshi, D. Blackmore. Sigma map dynamics and bifurcations. *Regular and Chaotic Dynamics* **22**(6) 740-749 (2017); DOI: 10.1134/S1560354717060107. Invited special issue dedicated to the memory of Vladimir Arnold (1937 - 2010).

10) A. Rahman, D. Blackmore. Threshold voltage dynamics of chaotic RS flip-flops. *Chaos, Solitons & Fractals* **103C** 555-566 (2017); DOI: 10.1016/j.chaos.2017.07.014

9) A. Rahman, D. Blackmore. Neimark–Sacker bifurcation and evidence of chaos in a discrete dynamical model of walkers. *Chaos, Solitons & Fractals* **91** 339-349 (2016); DOI: 10.1016/j.chaos.2016.06.016

8) <u>R. Goodman</u>, A. Rahman, M.J. Bellanich, C.N. Morrison. A mechanical analog of the two-bounce resonance of solitary waves: modeling and experiment. *Chaos* **25**, 043109 (2015); DOI: 10.1063/1.4917047

7) <u>D. Blackmore</u>, A. Rahman, J. Shah. Discrete dynamical modeling and analysis of the R-S flip-flop circuit. *Chaos, Solitons & Fractals* **42** 951-963 (2009); DOI: 10.1016/j.chaos.2009.02.032

REFEREED CONFERENCE PROCEEDINGS

6) A. Rahman, S.R. Dhruba S. Ghosh, R. Pal. Recursive model for dose-time responses in pharmacological studies. (2018); Proceedings of the Fifth International Workshop on Computational Network Biology: Modeling, Analysis, and Control.

DISSERTATION

5) A. Rahman. Qualitative Modeling of Chaotic Logical Circuits and Walking Droplets: A Dynamical Systems Approach. (2017) (link: `http://archives.njit.edu/vhlib/etd/2010s/2017/njit-etd2017-049/njit-etd2017-049.php`)

Tutorials, National Lab Reports, Other

(4) <u>A. Rahman</u>, E. Kara, J. N. Kutz. From Sequences of Images to Trajectories: A Tracking Algorithm for Dynamical Systems. *SIAM News* (2023) `https://sinews.siam.org/Details-Page/from-sequences-of-images-to-trajectories-a-tracking-algorithm-for-dynamical-systems`.

3) Y. Joshi, <u>D. Blackmore</u>, A. Rahman. Generalized attracting horseshoes and chaotic strange Attractors. (Submission on hold due to the passing of D. Blackmore, preliminary version on arxiv: `https://arxiv.org/abs/1611.04133`).

2) A. Rahman. SIAM-dswebtutorials: Peixoto's Structural Stability Theorem (2013)

1) A. Rahman, N. Sereno, H. Shang. Benchmarking the Multipass Beam-Breakup Simulation Code BI. OAG-TN-2008-029. (2008)

MEDIA COVERAGE

UT Austin Center for Computational Oncology "paper of the week [17]" October, 2024. "Cancer mechanics: How physical cues influence cell migration, metastasis, and treatment". *EurekaAlert!* February, 28, 2020, *Global Health News Wire* March, 2, 2020. Sourced publications: [14, 15, 17]

MENTORING

Key: p – publication

Graduate students

2021 - Present Katherine Owens (Department of Applied Mathematics, University of Washington, PhD 2022; currently postdoc at Fred Hutch): Continuing mentorship with Ivana Bozic (UW - Amath) on the transport of CAR-T cells and the efficacy of immunotherapy.

2022 - 2024 Ike Wenceslao Griss (Department of Applied Mathematics, University of Washington): Mentoring with Nathan Kutz and Bamdad Hosseini (UW - Amath) on Kernel Regression and Sparse Identification techniques for quantum analogs.

2022 - 2024 Joseph Williams[p] (Department of Applied Mathematics, University of Washington): Mentoring with Nathan Kutz (UW - Amath, ECE, AI) on developing qauantum analog experiments.

2022 - 2024 Trevor Crupi (Department of Applied Mathematics, University of Washington): Mentoring with Ivana Bozic (UW - Amath) on social and biological spatio-temporal models. Defended MS thesis: June 6, 2022.

2019 - 2021 Erdi Kara[p] (Department of Mathematics and Statistics, Texas Tech University): Mentoring with Eugenio Aulisa (TTU - Math) on inhomogeneous - anisotropic drug diffusion in a tumor.

2018 Muhammad Shah Alam (Department of Mathematics and Statistics, Texas Tech University). Advisor: Angela Peace (TTU - Math). Title: Parameter Sensitivity Analysis of Dynamics of Ovarian Tumor Growth Model. Defended MS project: Nov. 2, 2018.

Highlighted Undergraduate students

Spring 2021 - 2024 Gonzalo Quinto[p] (Department of Applied Mathematics and Department of Physics, University of Washington): Continuing mentorship of my AMATH 499 student on Experimental and Theoretical Investigation of Damped-driven systems. Mentoring with Nathan Kutz (UW - Amath, ECE, AI)

Spring 2022 - 2024	Max Kim[P](Department of Environmental Engineering, University of Washington): Continuing mentorship of my AMATH 499 student on developing experiments for Hydrodynamic Quantum Analogs. Mentoring with Nathan Kutz (UW - Amath, ECE, AI)
Spring 2022 - 2023	George Zhang[P](Department of Applied Mathematics, University of Washington): Continuing mentorship of my AMATH 499 student on Machine Learning techniques applied to droplet tracking and modeling and Studying dynamical cancer models. Mentoring with Nathan Kutz (UW - Amath, ECE, AI)
Spring 2021 - 2023	Levi Rhoden[P](Department of Mechanical Engineering, University of Washington): Continuing mentorship of my AMATH 499 student on developing experiments for Hydrodynamic Quantum Analogs. Mentoring with Nathan Kutz (UW - Amath, ECE, AI)
Fall 2019 - Spring 2021	Joel Garza (Department of Mechanical Engineering, Texas Tech University): Serving as mentor for the **National Academy of Engineering Grand Challenges** Scholars Program.
Summer 2017	Parth Sojitra[P](Department of Electrical Engineering, New Jersey Institute of Technology): Mentoring, with Denis Blackmore (NJIT - Math), a summer provost scholar on developing "real-world" systems that replicate generalized attracting horseshoe dynamics.
June 2015 - August 2017	Ian Jordan[P](Department of Electrical Engineering, New Jersey Institute of Technology; Currently: received PhD in 2022 from Stony Brook University in Computational Neuroscience): Mentoring, with Denis Blackmore (NJIT - Math), a summer provost scholar (2015 and 2016) and recipient of the NJIT phase II seed grant (2016) on designing and building chaotic electronic circuits.
Summer 2015	Leila Wooten (Department of Mathematics, Bloomfield College): Mentoring, with Denis Blackmore (NJIT - Math), a **McNair scholar** on simulating and analyzing a 1D model for walking droplets.

High school students

Summer 2017	Karthik Murthy[P](Bridgewater–Raritan High School): Mentoring, with Denis Blackmore (NJIT - Math), a summer provost high school intern on developing "real-world" systems that replicate generalized attracting horseshoe dynamics.

TEACHING EXPERIENCE

○ **10 years of lecturing experience. 15 total years of teaching experience.**

GRADUATE TEACHING

University of Washington

Amath 600	Independent Research or Study. Spring 2022, Autumn 2022
Amath 582	Computational Methods For Data Analysis [Data Science, Machine Learning, etc.] Winter 2023

Texas Tech University

Math 5360	Practical Training in the Teaching of Undergraduate Mathematics. Fall 2018
Math 5346	Advanced Topics In Applied Mathematics I: Dynamical Systems, Asymptotics, and Numerics. Fall 2018

UNDERGRADUATE TEACHING

University of Washington

Amath 499	Undergraduate Reading and Research. Spring 2021, Spring 2022, Autumn 2022, Spring 2023, Autumn 2023
Amath 482	Computational Methods For Data Analysis [Data Science, Machine Learning, etc.] Winter 2023
Amath 481	Scientific Computing. Autumn 2020
Amath 352	Applied Linear Algebra and Numerical Analysis. Autumn 2020, Spring 2023, Summer 2024. `https://www.youtube.com/watch?v=RQOIgs7r5jc&list=PLe03sgeihQ7f_ccoU0-MsqBlOQf4KhD7i`
Amath 301	Beginning Scientific Computing. (over 400 students). Spring 2021, Winter 2022, Autumn 2023, Summer 2024. `https://www.youtube.com/watch?v=45Rzioq8RJM&list=PLe03sgeihQ7eJcDSBXKoOwBUC8odDyzNE`

Texas Tech University

Math 4350	Advanced Calculus I: Intro to Real Analysis. Spring 2018
Math 3351	Higher Mathematics for Engineers II: Partial Differential Equations. Fall 2017, Spring 2020

Math 3350	Higher Mathematics for Engineers I: Ordinary Differential Equations. Study Abroad 2019, Summer 2020
Math 3310	Intro to Proofs. Summer 2018
Math 2450	Calculus III. Fall 2019
Math 2360	Linear Algebra. Study Abroad 2019

New Jersey Institute of Technology

Math 491	Chaos Theory. Spring 2015. https://www.youtube.com/watch?v=X2AT6ZeFRxw&list=PLeO3sgeihQ7fb0Rped_Hj8wvHRBOfu5g7
Math 222	Ordinary Differential Equations. Fall 2014, Fall 2016
Math 112	Calculus II. Spring 2014, Fall 2015, Spring 2017

Substitute/Recitation

○ University of Washington: Amath 536 (Mathematical Modeling of Cancer)

○ New Jersey Institute of Technology: Math 110 (Precalculus), Math 111 (Calculus I), Math 112 (Calculus II), Math 139 (Trigonometry and Calculus), Math 222 (ODE), Math 332 (Complex Variables), Math 337 (Linear Algebra), Math 340 Lab (Numerical Methods Lab), Math 473 (Dynamical Systems), and Math 481/565 (Real Analysis).

○ University of Delaware: Math 241 (Calculus I).

TALKS

INVITED

March 4, 2024	**GSU Applied and Computational Math seminar**, *Georgia State University*, Atlanta, GA Walking droplets as a damped-driven system
November 30, 2023	**Data Science for Dynamical Systems Seminar**, *Pacific Northwest National Laboratory*, Seattle, WA Mechanistic Models in a Data-driven World: From Physics to Biology
May 15, 2023	**Society for Industrial and Applied Mathematics Dynamical Systems 2023**, *Hilton*, Portland, OR Nonlinear Dynamics, Bifurcations, and Chaos: The Works of Denis Blackmore.
December 5, 2022	**NJIT Fluid Mechanics and Waves seminar**, *New Jersey Institute of Technology*, Newark, NJ Walking droplets as a damped-driven system
November 15, 2022	**MIT Physical Applied Math seminar**, *Massachusetts Institute of Technology*, Cambridge, MA Walking droplets as a damped-driven system
November 14, 2022	**BU Dynamical Systems seminar**, *Boston University*, Boston, MA Spatio-temporal models of cancer treatments
November 2, 2022	**NJIT Albert Dorman Honors College Colloquium**, *New Jersey Institute of Technology*, Newark, NJ Simple Models in a Complex World: From Physics to Sociology
January, 25, 2022	**Department of Applied Mathematics**, *University of Washington*, Seattle, WA Early Career Research Panel for Undergraduate Applied Math Majors
May, 24, 2021	**Society for Industrial and Applied Mathematics Dynamical Systems 2021**, *Virtual Conference* Diffusive behavior in hydrodynamic quantum analogs
February 18, 2021	**University of Nebraska - Lincoln Mathbio Seminar**, *University of Nebraska*, Lincoln, NE Physics-based models of cancer drug response in solid tumors: towards computer-aided treatment strategies
March 2, 2020	**American Physical Society March Meeting**, *Virtual session held on March 4th due to cancelation of APS March*, GSNP, Postdoctoral speaker award finalist Diffusive behavior in walking droplets
January 24, 2020	**University of Kentucky Math Seminar**, *University of Kentucky*, Lexington, KY Mathematically Tractable Models in a Complex World: From Physics to Biology.

May 20, 2019	**Society for Industrial and Applied Mathematics Dynamical Systems 2019**, *Snowbird Resort*, Snowbird, UT Simple Proofs of Chaos for Logical Circuit and Walking Droplet Models.
April 16, 2019	**Rennes Physics Seminar**, *Université de Rennes*, Rennes, FR Coupled transport-population models for drug distribution and tumor cell death.
February 26, 2019	**TTU SIAM Chapter Early Career Colloquium**, *Texas Tech University*, Lubbock, TX Mathematically tractable models in cancer biophysics and walking droplets
January 9, 2019	**Purdue Mechanical Engineering Seminar**, *Purdue University*, West Lafayette, IN Coupled transport-population models for drug distribution and tumor cell death.
November 28, 2018	**TTU Applied Mathematics Seminar**, *Texas Tech University*, Lubbock, TX Simple Transport - Population Models in Solid Tumors
November 6, 2018	**TTU BioMathematics Seminar**, *Texas Tech University*, Lubbock, TX Simple Transport - Population Models in Solid Tumors
October 31, 2018	**TTU Applied Mathematics Seminar**, *Texas Tech University*, Lubbock, TX Discrete Dynamical Models of Walking Droplets
April 3, 2018	**NJIT MathBio Seminar**, *New Jersey Institute of Technology*, Newark, NJ Tumor ablation through drug diffusion
February 27, 2018	**TTU SIAM Chapter Young Scholar Symposium**, *Texas Tech University*, Lubbock, TX Simple models in a complex world
February 6, 2018	**TTU BioMathematics Seminar**, *Texas Tech University*, Lubbock, TX Tumor Ablation Through Drug Diffusion
May 21, 2017	**Society for Industrial and Applied Mathematics Dynamical Systems 2017**, *Snowbird Resort*, Snowbird, UT Bifurcations in Walking Droplet Dynamics.
February 22, 2017	**MIT Numerical Methods for PDEs seminar**, *Massachusetts Institute of Technology*, Cambridge, MA Dynamical modeling and analysis of walking droplets and chaotic logical circuits
February 8, 2017	**URI Dynamical Systems Seminar**, *University of Rhode Island*, South Kingstown, RI Dynamical modeling and analysis of chaotic logical circuits and walking droplets
November 14, 2015	**American Mathematical Society Sectional Conference Fall 2015**, *Rutgers University*, New Brunswick, NJ Neimark-Sacker Bifurcation and Evidence of Chaos in a Discrete Dynamical Model of Walkers
October 7, 2015	**NJIT Department of Mechanical and Industrial Engineering Colloquium**, *New Jersey Institute of Technology*, Newark, NJ The Chaotic Ballet of Walking Droplets
May 21, 2015	**LANL Center for Nonlinear Studies Seminar**, *Los Alamos National Laboratory*, Los Alamos, NM A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits
May 18, 2015	**Society for Industrial and Applied Mathematics Dynamical Systems 2015**, *Snowbird Resort*, Snowbird, UT A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits
March 7, 2015	**American Mathematical Society Sectional Conference Spring 2015**, *Georgetown University*, Washington DC A Mechanical Analog and Discrete Modeling of the n-bounce Resonance of Solitary Waves
November 8, 2014	**American Mathematical Society Sectional Conference Fall 2014**, *University of North Carolina*, Greensboro, NJ Further Analysis of Discrete Dynamical Models of the RS Flip-Flop Circuit
March 29, 2014	**American Mathematical Society Sectional Conference Spring 2014**, *University of Maryland Baltimore County*, Baltimore, MD A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits

CONTRIBUTED

March 6, 2020	**American Physical Society March Meeting**, *Virtual session held on March 3rd due to cancelation of APS March*, GSOFT, APS GSNP Postdoctoral speaker award finalist talks Diffusive behavior in walking droplets

January 5, 2018	**Dynamic Days 2018**, *Denver Hilton City Center*, Denver, CO The Chaotic Ballet of Walking Droplets.
July 3, 2017	**Workshop on Wave-Particle Duality and Hydrodynamic Quantum Analogs**, *University of Liège*, Liège, BE Dynamics of Discrete Dynamical Models of a Walker in an Annulus.
January 4, 2017	**Joint Mathematics Meetings 2017**, *Hyatt Regency Atlanta and Marriott Atlanta Marquis*, Atlanta, GA The Chaotic Ballet of Walking Droplets.
September 24, 2016	**American Mathematical Society Sectional Conference Fall 2016**, *Bowdoin College*, Brunswick, ME Neimark-Sacker bifurcations and evidence of chaos in a discrete dynamical model of walkers.
June 21, 2016	**NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ A Tempest in The Mathematics of Time: A brief history of chaos and its appearance in walking droplets and electronic circuits.
November 24, 2015	**American Physical Society 68th Annual Division of Fluid Dynamics Meeting**, *Hynes Convention Center*, Boston, MA Neimark-Sacker Bifurcation and Evidence of Chaos in a Discrete Dynamical Model of Walkers
June 11, 2015	**NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ Neimark-Sacker Bifurcation and Evidence of Chaos in a Discrete Dynamical Model of Walkers
July 24, 2014	**NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ A Mechanical Analog of the Chaotic Scattering in Solitary Waves
January 17, 2014	**Joint Mathematics Meetings 2014**, *Baltimore Convention Center*, Baltimore, MD Peixoto's structural stability theorem: The one-dimensional version
January 15, 2014	**Joint Mathematics Meetings 2014**, *Baltimore Convention Center*, Baltimore, MD A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits
June 21, 2013	**Mathematical Problems in Industry 2013**, *Worcester Polytechnic Institute*, Worcester, MA Phase Field Formulation for Microstructure Evolution in Oxide Ceramics
June 11, 2013	**NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ Peixoto's structural stability theorem: The one-dimensional version
July 10, 2012	**NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ Logical circuits: A scheme for discrete modeling and analysis.
April 20, 2011	**Hallenbeck Graduate Student Seminar**, *University of Delaware*, Newark, DE Mechanical Chaotic Scattering: The Adventures in the Valley of Chaos
October 20, 2010	**Hallenbeck Graduate Student Seminar**, *University of Delaware*, Newark, DE A scheme for modeling and analyzing the dynamics of logical circuits

CO-AUTHORED

May 14, 2023	**Society for Industrial and Applied Mathematics Dynamical Systems 2023**, *Hilton*, Portland, OR Presenter: Katherine Owens. *Modeling Local Administration of CAR T-cell Therapy for Solid Tumors.*
May 15, 2023	**Society for Industrial and Applied Mathematics Dynamical Systems 2023**, *Hilton*, Portland, OR Presenter: Gonzalo Ferrandez Quinto. *Discrete Dynamical Model for the Hydrodynamic Analog of a Quantum Mirage.*
November 5, 2019	**TTU BioMathematics Seminar**, *Texas Tech University*, Lubbock, TX Presenter: Erdi Kara. *Tumor ablation due to inhomogeneous - anisotropic diffusion in generic 3 dimensional topologies*
May 22, 2017	**Society for Industrial and Applied Mathematics Dynamical Systems 2017**, *Snowbird Resort*, Snowbird, UT Presenter: Denis Blackmore; *Analysis of New Walking Droplet Bifurcations*
January 4, 2017	**Joint Mathematics Meetings 2017**, *Hyatt Regency Atlanta and Marriott Atlanta Marquis*, Atlanta, GA Presenter: Ian Jordan; *Discrete dynamical modeling and experimental investigation of chaotic NOR gates and set/reset flip-flops.*
May 20, 2013	**Society for Industrial and Applied Mathematics Dynamical Systems 2013**, *Snowbird Resort*, Snowbird, UT Presenter: Hao Wu; *Analysis and Simulation of the BSR Model*

POSTER PRESENTATIONS

March 16, 2021 — **American Physical Society March meeting**, *Virtual*, USA
Physics-based models and simulations of cancer drug response in solid tumors. (First-place in of FECS poster award)

February 27, 2021 — **MAA Golden Section**, *Virtual*, West Coast, USA
Mathematical Art Exhibition

January 4-6, 2019 — **Dynamic Days 2019**, *Hilton Orrington Hotel*, Evanston, IL
Standard map-like models for single and multiple walkers in an annular cavity.

October 6-11, 2018 — **Congress of Neurological Surgeons 2018**, *Marriott Marquis*, Houston, TX
A prospective analysis tool to assess potential success for extra-femoral mechanical thrombectomy; Presenter: Mousa K. Hamad

June 5-6, 2015 — **Frontiers in Applied and Computational Mathematics 2015**, *New Jersey Institute of Technology*, Newark, NJ
A Scheme for Analyzing the Dynamics of Logical Circuits

May 22-23, 2014 — **Frontiers in Applied and Computational Mathematics 2014**, *New Jersey Institute of Technology*, Newark, NJ
A Scheme for Analyzing the Dynamics of Logical Circuits

January 16, 2014 — **Joint Mathematics Meetings 2014**, *Baltimore Convention Center*, Baltimore, MD
A Scheme for Analyzing the Dynamics of Logical Circuits

October 31, 2013 — **Graduate Student Association Research Day 2013**, *New Jersey Institute of Technology*, Newark, NJ
A Scheme for Analyzing the Dynamics of Logical Circuits

May 31 - June 2, 2013 — **Frontiers in Applied and Computational Mathematics 2013**, *New Jersey Institute of Technology*, Newark, NJ
A Scheme for Analyzing the Dynamics of Logical Circuits

May 21 - 23, 2010 — **Frontiers in Applied and Computational Mathematics 2010**, *New Jersey Institute of Technology*, Newark, NJ
A Scheme for Analyzing the Dynamics of Logical Circuits

April 19, 2009 — **NJIT Experience Day**, *New Jersey Institute of Technology*, Newark, NJ
Discrete Dynamical Modeling and Analysis of the R-S flip-flop circuit

April 8, 2009 — **Dana Knox Student Research Showcase**, *New Jersey Institute of Technology*, Newark, NJ
Discrete Dynamical Modeling and Analysis of the R-S flip-flop circuit

March 29, 2009 — **Garden State Undergraduate Mathematics Conference**, *Monmouth University*, Monmouth, NJ
Discrete Dynamical Modeling and Analysis of the R-S flip-flop circuit

May 19 - 21, 2008 — **Frontiers in Applied and Computational Mathematics 2008**, *New Jersey Institute of Technology*, Newark, NJ
Chaos of the R-S flip-flop circuit

April 5, 2008 — **NJIT Experience Day**, *New Jersey Institute of Technology*, Newark, NJ
Chaos of the R-S flip-flop circuit

RESEARCH WORKSHOPS

June 13-17, 2016 — **Mathematical Problems in Industry 2016**, *Duke University*, Durham, NC
Worked on Predicting Physician Triage; a problem from *Revon Systems*

June 22 - 26, 2015 — **Mathematical Problems in Industry 2015**, *University of Delaware*, Newark, DE
Worked on "Desulfurization of Natural Gas for Fuel Cells"; a problem from *Bloom Energy*

September 15 - 19, 2014 — **Boston/Keio Universities Workshop 2014**, *Boston University*, Boston, MA
Workshop on current theoretical and industrial Dynamical Systems problems

June 23 - 27, 2014 — **Mathematical Problems in Industry 2014**, *New Jersey Institute of Technology*, Newark, NJ
Worked on "Effects of Membrane Morphology on Separation Efficiency"; a problem from *Pall Corp.*

June 17 - 21, 2013 — **Mathematical Problems in Industry 2013**, *Worcester Polytechnic Institute*, Worcester, MA
Worked and presented on "Phase Field Formulation for Microstructure Evolution in Oxide Ceramics"; a problem from *Corning*

June 11 - 15, 2012	**Mathematical Problems in Industry 2012**, *University of Delaware*, Newark, DE Worked on "The Use of Viscous Shear in Air Bearing Gaps for Precise Web Tension and Temperature Control"; a problem from *New Way Air Bearings*
June 5 - 8, 2012	**Graduate Student Math Modeling Camp 2012**, *Rensselaer Polytechnic Institute*, Troy, NY Worked on "Modeling a cylindrical plunger viscometer"; a problem presented by *Professor Kara Maki*
June 12 - 17, 2011	**Mathematical Problems in Industry 2011**, *New Jersey Institute of Technology*, Newark, NJ Worked on "Dynamic tumor growth modelling"; a problem from *Novartis*
June 11 - 12, 2011	**Graduate Student Math Modeling Camp 2011**, *New Jersey Institute of Technology*, Newark, NJ Worked on "Modeling Photon generation"; a problem from *Lucent*

SERVICE

Departmental Service

- Serving on the Diversity, Equity, and Inclusion Committee pre-application review for prospective historically underrepresented students
- Organizing and Managing speaker schedule for the Boeing Distinguished Colloquium
- Helping to maintain departmental autograder in collaboration with sysadmin

External

May 14-18, 2023	Co-organizer for minisymposium on *In memoriam of the work of Denis Louis Blackmore* at the SIAM Conference on Applications of Dynamical Systems (DS23).
May 23-27, 2021	Co-organizer for minisymposium on *Nonlinear Dynamics of Fluid-Solid Interactions: from Physics to Biology* at the SIAM Conference on Applications of Dynamical Systems (DS21).
May 19-23, 2019	Co-organizer for minisymposium on *Unusual Complexity in Applied Dynamical Models* at the SIAM Conference on Applications of Dynamical Systems (DS19).
May 21-25, 2017	Co-organizer for minisymposium on *Exotic Bifurcations in Fluid and Granular Dynamics* at the SIAM Conference on Applications of Dynamical Systems (DS17).
Guest editor for:	Mechanics Research Communications
Reviewed for:	Journal of Fluid Mechanics, Physical Review E, Chaos: An Interdisciplinary Journal of Nonlinear Science, Journal of Nonlinear Science, Communications in Nonlinear Science and Numerical Simulations, Mechanics Research Communications (on regular reviewer list), Journal of Difference Equations and Applications (on regular reviewer list), Journal of Applied Mathematics and Computing, CRC Press, Journal of Biological Dynamics, Differential Equations and Applications

PROFESSIONAL AFFILIATIONS

- Society for Industrial and Applied Mathematics
- American Physical Society

TECHNICAL SKILLS

- Programming (in order of ongoing experience): MATLAB, C++, Python, Java, MPI (novice)