DARSH GANDHI

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EDUCATION

PhD, Applied Mathematics, University of Maryland - College Park *(incoming)* — *Aug 2025 - May 2030*
BS, Mathematics, Biology Minor, University of Texas at Arlington (*Magna Cum Laude*) — Aug 2021 - May 2025

GRANTS ACQUIRED

D Gandhi (PI) (with Co-PIs: T Johnson, T Jorgensen), "Mathposium: Student Research Symposium and Peer Mentoring Network," Sponsored by National Science Foundation (NSF DUE-2437995), Federal Funded, $29,375.00. (Oct 1, 2024 - *Sep 30, 2025*).

PUBLICATIONS, PREPRINTS, & PROCEEDINGS

Refereed Articles:

1. MA Bartolo, A Taylor-LaPole, **D Gandhi**, A Johnson, Y Li, E Slack, I Stevens, Z Turner, JD Weigand, C Puelz, D Husmeier, MS Olufsen. Computational framework for the generation of one-dimensional vascular models accounting for uncertainty in networks extracted from medical images. J Physiol. Aug 2024. 10.1113/JP286193
2. C Peterson, **D Gandhi**, A Carlson, A Lubkemann, E Richardson, JE Serralta, MS Allen, S Roy, C Kribs, H Kojouharov. A SIMPL model of phage-bacteria interaction accounting for mutation and competition. Bull Math Biol. Jun 2025. 10.1007/s11538-025-01478-2

Conference Proceedings:

3. MS Olufsen, MA Bartolo, P Hernandez-Cerdan, **D Gandhi**, A Johnson, E Slack, I Stevens, Z Turner. Importance of uncertainty in image segmentation in one-dimensional vascular network models. *8th International Conference on Computational & Mathematical Biomedical Engineering - CMBE Proceedings*, Volume 1, pg. 290-293. June 2024. *(peer-reviewed)*.

Articles In Review:

4. S Roy, N Abu Qarnayn, M Alajmi, A Alghamdi, I Alshaoosh, S Chaturvedi, O Dehinsilu, R El-Adawy, **D Gandhi**, D Patterson, J Rodriguez. A Liouville dynamical modeling and control framework for esophageal cancer-induced immune response (*submitted Apr 2025*).
5. C Peterson, **D Gandhi**, E Slack, E Rubio, A Claxton, C Kribs. A novel mathematical model of seasonality in oropouche virus transmission in Amazonas, Brazil (*submitted Jun 2025*).

Industry Reports:

6. T Akinwande, K Das, **D Gandhi**, MCM Garcia, G Hewitt, Z Li, LF Lopes, A Petrucci, I Sanz, H Ji. Physics-based and data-driven modeling of lava flows. *Mathematics in Industry Reports*. June 2025.
7. M Aminian, N de Silva, S Dodamgodage, DA Edwards, **D Gandhi**, N Harbour, HV Le, LF Lopes, A Petrucci, T Samakhoana. A framework for the generation and analysis of synthetic patient health records for Vironix Health. *Mathematics in Industry Reports*. June 2025.

RESEARCH EXPERIENCE

Lead Researcher, Mentors: Drs. Hristo Kojouharov, Souvik Roy, Benito Chen

1. *On the Role of the Immune System in Age-Related Vascular Disease*: Aug 2023 - *present*
   - Created and analyzed 5 ordinary differential equation (ODE) models to examine the effect of $CD8^+$ T cells on aortic wall stiffness and cardiovascular aging.
   - Implementing non-standard finite difference (NSFD) schemes to solve the nonlinear systems and performing data-fitting and sensitivity analysis.
   - Collaborating with the Integrative Immunology Lab; mentored high school senior, Dylan Luong.
2. *A Mathematical Model for Control of Liver Cancer*: Sep 2024 - *present*
   - Developing, analyzing, and validating an ODE model to investigate competition dynamics between healthy and cancerous hepatocytes after partial hepatectomy.
   - Creating and solving an optimization problem to determine optimal treatment scheduling.

NSF Math for Human Health RTG Scholar, Mentors: Drs. Hristo Kojouharov, Souvik Roy, Christopher Kribs

1. *A SIMPL Model of Phage-Bacteria Interactions*: Feb 2024 - May 2025
   - Modeled bacteriophage interaction with *P. aeruginosa* in collaboration with Dr. Michael Allen at the UNT Health Science Center at Fort Worth.
   - Performed literature review, created and analyzed 2 ODE models, wrote scientific code in MATLAB, performed data cleaning and data fitting.
   - Submitted a journal article and presented this work at 6 local and national conferences and math clubs, winning two presentation awards.
2. *Optimizing Immunotherapeutic Treatment of Esophageal Adenocarcinoma*: Aug 2024 - *present*
   - Performed literature review and created a model investigating PD-L1 positive esophageal cancer cells and PD-1 positive $CD4^+$ and $CD8^+$ T cells. Analyzing and numerically implementing the model and developing an optimization problem.
   - Collaborating with 2 undergraduate and graduate students, 2 math faculty, and Dr. David Wang at the University of Michigan Rogel Cancer Center.

3. *Investigating the Impact of Precipitation and Temperature on Oropouche Virus Transmission Dynamics*: Oct 2024 - *present*
   - Developed and analyzed an autonomous ODE model of Oropouche virus (OROV) transmission dynamics. Performed literature review and data acquisition and analysis.
   - Implemented numerical methods to solve the autonomous system and an analogous nonautonomous system and estimated parameters. Quantifying uncertainties in parameter estimates using a Bayesian approach.
4. *Nonstandard Finite Difference Methods for Partial Differential Equations*: Sep 2024 - *present*
   - Developing nonstandard finite difference (NSFD) methods for the advection-diffusion equation.

Researcher - North Carolina State University, Mentors: Drs. Mette Olufsen, Michelle Bartolo

1. *A Computational Framework for the Generation of Vascular Networks*: May 2023 - Jan 2024
   - Developed a robust algorithm to extract physiologically-accurate radii and length values for pulmonary and aortic vessels.
   - Performed image segmentation of the pulmonary vasculature using 3D Slicer, generated vessel networks in the Vascular Modeling Toolkit, Spatial Graph Extractor, and MATLAB, and analyzed 1D fluid dynamics simulations on those networks using R.
   - Resulted in a journal article and peer-reviewed conference paper. Presented this work at 10 local and national conferences and won 3 presentation awards.

PRESENTATIONS, WORKSHOPS, & CONFERENCES

Research Presentations (Oral):

1. Texas Undergraduate Math Conference — Oct 27 - 28, 2023
   Uncertainty of Image Segmentation on Pulmonary Hemodynamics
2. MAA 103rd Annual Texas Section Meeting — Mar 22 - 23, 2024
   Computational Framework for Patient-Specific Cardiovascular Modeling
3. Tarleton State University Math Club — Oct 2, 2024
   A SIMPL Model of Phage-Bacteria Interactions
4. 7th Annual SIAM TX-LA Section Meeting — Oct 11 - 13, 2024
   MS18: Recent Advances in Applied Mathematics by Undergraduates *(mini-symposium organizer)*
   Optimization of Lesion Removal in CTEPH Patients
5. International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems — Oct 18 - 19, 2024
   A SIMPL Model of Phage-Bacteria Interactions
6. Mathematical Association of America, UTA Chapter — Nov 6, 2024
   Results from Outside of Class: Internships, Research, and Math Clubs
7. Gulf Coast Undergraduate Research Symposium — Nov 9 - 10, 2024
   A SIMPL Model of Phage-Bacteria Interactions
8. Joint Mathematics Meeting 2025 — Jan 9, 2025
   A SIMPL Model of Phage-Bacteria Interactions
9. 17th Annual Texas-Oklahoma Regional Undergraduate Symposium (TORUS) — Feb 22, 2025
   Investigating the Impact of Climate on Oropouche Virus Transmission Dynamics
10. 104th Annual MAA Texas Section Meeting — Mar 28 - 29, 2025
    A SIMPL Model of Phage-Bacteria Interactions

Research Presentations (Poster):

11. 2023 Annual S-STEM Scholars Meeting — Sep 14 - 16, 2023
    Uncertainty of Image Segmentation on Pulmonary Hemodynamics
12. Mathposium 2023 (*Organizer*) — Nov 17, 2023
    Uncertainty of Image Segmentation on Pulmonary Hemodynamics
13. Joint Mathematics Meeting 2024 — Jan 3 - 6, 2024
    Generating Vascular Models and Assessing Uncertainty in Medical Images
14. 8th Annual Gulf States Math Alliance Conference — Feb 23 - 25, 2024
    Generating Vascular Models and Assessing Uncertainty in Medical Images
15. Emerging Researchers National Conference in STEM 2024 — Mar 14 - 16, 2024
    Uncertainty of Image Segmentation on Pulmonary Hemodynamics
16. Discover Student Research Symposium 2024 — Apr 19, 2024
    Computational Framework for Patient-Specific Cardiovascular Modeling
17. Mathposium 2024 *(Organizer)* — Nov 15 - 16, 2024
    Generating Vascular Models and Assessing Uncertainty in Medical Images
18. 9th Annual Gulf States Math Alliance Conference — Feb 14 - 16, 2025
    Generating Vascular Models and Assessing Uncertainty in Medical Images
19. Mathematics of Data, Dynamics, and Life Sciences 2025 — Mar 20 - 21, 2025
    A SIMPL Model of Phage-Bacteria Interactions
20. Discover Student Research Symposium 2025 — Apr 18, 2025
    A Novel Mathematical Model of Oropouche Virus Transmission Dynamics

Outreach Presentations and Panels:

21. Mathematical Association of America, UTA Chapter — Sep 20, 2023
    On Finding Internships, Fellowships, and More *(organizer/speaker)*
22. UTA Mathematics Freshman Seminar — Nov 1, 2023
    What Does it Mean to Succeed in Math? *(organizer/moderator)*

23. Mathposium 2023 (*Organizer*) — Nov 17, 2023
    On BIG Math Careers — *(moderator)*
24. SURGE Seminar — Dec 4, 2023
    Semester Recap and Finding Community in SURGE — *(invited talk)*
25. Pi Mu Epsilon Texas Iota Special Session — Apr 1, 2024
    Why a Math Major? — *(organizer/moderator)*
26. Mathematical Association of America, UTA Chapter — Apr 17, 2024
    On Math and STEM Degrees — *(organizer/moderator)*
27. UTA Mathematics Freshman Seminar — Oct 30, 2024
    The Undergraduate Math Experience — *(panelist)*
28. Mathposium 2024 *(Organizer)* — Nov 15 - 16, 2024
    Graduate School Panel — *(moderator)*
    REUs/Internships Panel — *(moderator)*
29. Joint Mathematics Meeting 2025 — Jan 11, 2025
    Mathposium: A Student-led Conference and Mentoring Initiative — *(contributed talk)*
30. 9th Annual Gulf States Math Alliance Conference — Feb 14 - 16, 2025
    Choosing a Graduate Program — *(panelist)*
31. Independence High School Mu Alpha Theta Chapter — Feb 20, 2025
    BIG Careers with Mathematics — *(invited talk)*

Other Conferences and Workshops Attended:

32. Mathposium 2022 (*Organizer*) — Nov 18, 2022
33. OURFA²M² — Nov 19 - 20, 2022
34. 7th Annual Gulf States Math Alliance Conference — Feb 24 - 26, 2023
35. 2023 Field of Dreams Conference — Nov 3 - 5, 2023
36. Career Paths in the Mathematical Sciences, MΔth Alliance Workshop — Jun 6 - 7, 2024
37. SIAM Graduate Student Math Modeling Camp (GSMMC) — Jun 4 - 7, 2025
38. SIAM Mathematical Problems in Industry (MPI) Workshop — Jun 9 - 13, 2025

AWARDS

Research Awards

1. Outstanding Student Talk, *Pi Mu Epsilon* — Jan 2025
2. Outstanding Session Presentation - Computational and Applied Mathematics, *Rice University* — Nov 2024
3. Best Undergraduate Presentation - 2nd Place, *Discover Symposium* — Apr 2024
4. Best Applied Math Presentation - 1st Place, *MAA Texas Section* — Mar 2024
5. Best Poster Presentation - 2nd Place, *Emerging Researchers in STEM* — Mar 2024

Scholarly Awards

6. Edmund Landau Award, *American Mathematical Society* — Aug 2024
7. H. A. D. Dunsworth Scholarship, *UTA Mathematics* — Apr 2023, Apr 2024
8. R. Kannan Memorial Fund Scholarship, *UTA Mathematics* — Apr 2022, Apr 2023, Apr 2024
9. Mathematics for Human Health Scholarship (NSF RTG), *UTA Mathematics* — Aug 2023 - May 2025
10. Chance Vought Endowed Scholarship, *UTA Science* — Jul 2023
11. Ann H. Benham Endowed Scholarship, *UTA Science* — Apr 2023
12. SURGE Scholarship (NSF S-STEM), *UTA Mathematics* — Sep 2022 - May 2024
13. Dean's List, *UTA Science* — Jan 2022 - Dec 2023
14. Maverick Academic Scholarship, *UTA* — Aug 2021 - May 2025
15. Freshman Distinction, *UTA Division of Student Success* — Jan 2022

Travel Awards

16. Undergraduate JMM Travel Grant, *Pi Mu Epsilon* ($1,200) — Nov 2024
17. 7th Annual Section Meeting, *SIAM TX-LA Section* ($500) — Oct 2024
18. Emerging Researchers National Conference, *AAAS* ($1,250) — Mar 2024
19. Undergraduate JMM Travel Grant, *Pi Mu Epsilon* ($1,200) — Nov 2023
20. 2023 Annual S-STEM Scholars Meeting, *AAAS* ($1,250) — Sep 2023

Other Awards

21. Outstanding Student Contributions to the Math Department, *UTA Mathematics* — Apr 2023
22. SMART Scholarship ($160,000 - declined award), *U.S. Department of Defense* — Mar 2023
23. Outstanding Student Leader Award (nominated), *UTA Division of Student Affairs* — Feb 2023, Feb 2024, Jan 2025

PRESS

1. MAA Focus, Meet a Mathematician — Oct 2024
2. Department of Math adds up future and fun during Friday's Mathposium — Nov 2023
3. NSF S-STEM Scholar Highlight — May 2023
4. Students Advocate for UTA During Visit to State Capitol — Apr 2023

LEADERSHIP & SERVICE

University of Texas at Arlington **Arlington, TX**

Mathposium, *Founder/Organizer* Sep 2022 - *present*

- Created and led teams of student organizers to host the Mathposium in 2022, 2023, and 2024, a conference focused on exposing undergrads to math research and fostering peer mentor pairings between grad students and undergrads.
- Recruited 80 undergraduate and graduate students to present their research from around Texas. Organized and hosted more than 300 participants. Raised more than $40,625 in funding as PI on grants and through internal sponsors.

Mathematical Association of America at UTA, *President* Aug 2022 - Aug 2024

- Hosted 31 general body meetings, 11 game nights, and 50 exam review sessions across 4 semesters.
- Generated $7,875 from fundraisers and managed spending to create more than $3,000 in profit while hosting over double the events compared to past years. Created a scholarship fund for student members.

Annual Calculus Bowl, *Volunteer* Oct 2022 - Mar 2025
Pi Mu Epsilon, Texas Iota, *Vice President* May 2023 - May 2025
Math Bio Club, *Founding President* Jan 2024 - Dec 2024
Actuarial Science Club, *Interim Vice President* Aug 2024 - Oct 2024
Association for Women in Mathematics, *President* Jan 2025 - May 2025

Professional Organizations

SIAM CSE25 Local Engagement & Student Support, *Volunteer* Aug 2023 - Mar 2025
Society for Mathematical Biology at JMM 2024, *Volunteer* Jan 2024
7th Annual SIAM Texas-Louisiana Section Meeting, *Mini-symposium Organizer* Jun 2024 - Oct 2024
8th Annual SIAM Texas-Louisiana Section Meeting, *Mini-symposium Organizer* May 2025 - *present*

OTHER

University of Texas at Arlington **Arlington, TX**

Grader/Proctor *Aug 2023 - May 2025*

- Proctored departmental exam sessions for Contemporary Math to Calculus III. Communicated with more than 50 instructors and 1000 students on test days.
- Graded 55 quizzes weekly, provided insightful feedback, and added positive comments to combat math anxiety and help students improve scores for a combined Differential Equations & Linear Algebra course (Instructor: Dr. Theresa Jorgensen).

Texas A&M University **College Station, TX**

Modeling and Simulation with PDEs Summer School *May 2024*

- Learned theory behind modeling using ODEs and partial differential equations (PDEs), analytically solving PDEs, and creating and implementing finite difference and finite element schemes to solve PDEs.
- Investigated a family of nonlinear dispersive PDEs used to model soliton waves and developed and implemented finite difference methods in Python to solve them (Mentor: Jordan Hoffart).

California State Polytechnic University, Pomona **Pomona, CA**

SIAM Graduate Student Math Modeling Camp *Jun 2025*

- Learned basics for math research in industry, including model reduction, numerical linear algebra, and scientific writing.
- Implemented POD-DEIM, SVD, and QR decomposition algorithms to reconstruct images of lava flows to find optimal sensor placements to detect future volcanic eruptions (Mentor: Dr. Hangjie Ji).

Claremont Graduate University **Claremont, CA**

41st Annual Mathematical Problems in Industry Workshop *Jun 2025*

- Implemented generative adversarial networks (GANs) to generate electronic health records of chronic kidney disease (CKD).
- Measured the realness and accuracy of synthetic patient data using Gaussian mixture models and maximum mean discrepancy.
- Created an improved survey for Vironix Health to send to clinicians to judge the accuracy and realness of synthetic patient data, accounting for clinician bias due to factors such as specialty and location.

SKILLS

Soft Skills Teamwork, Leadership, Adaptability, Persistence
Coding MATLAB, Mathematica, Java, Python, R
Tools 3D Slicer, Vascular Modeling Toolkit, SGExt, Paraview, Jupyter, LaTeX