JITHIN D. GEORGE

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EDUCATION

2018-2024 **Ph.D., Engineering Sciences and Applied Mathematics**, *Northwestern University*.
G.P.A: 3.693/4.00 Adviser: Niall Mangan
Research Topics:
- Numerical and analytic methods for simulating electrocatalytic reaction environments.
- Complex time integrators with improved accuracy and stability.
- Mathematical modeling and hidden parameter estimation for a CRISPR-based COVID-19 diagnostic test.

2016-2018 **M.S., Applied Mathematics**, *University of Washington*.
Thesis: Green's Law and the Riemann Problem in Layered Media Adviser: Randall J. LeVeque.
G.P.A : 3.74/4.00

2011-2015 **B.E.(Hons.), Mechanical Engineering**, *BITS-Pilani*.
G.P.A: 8.11/10.00 (Major G.P.A: 8.36/10.00)

RESEARCH POSITIONS

Current **NAISE Postdoctoral Researcher**, *Northwestern University, Argonne National Laboratory*.
- I currently work with Dr. Valerie Taylor (MCS) and Dr. Maria Chan (CNM) at Argonne on mathematical approaches for material systems in collaboration with researchers at the MRSEC cluster at Northwestern University.
- I also work with Dr. Emil Constantinescu (MCS) and Dr. Pierre Darancet (CNM) on optimal control methods for optomechanical devices.

June -Sept 2022 **NSF-MSGI Intern**, *National Renewable Energy Laboratory*.
- Worked with Dr. Eliot Quon and Dr. Matt Churchfield on physics informed data assimilation for effective meso-micro coupling in the simulation of wind turbines.

2019 -2020 **Visiting Student**, *Argonne National Laboratory*.
- Worked with Dr. Emil Constantinescu on the development of inverse methods coupled with domain decomposition for shallow water equations

June - Dec 2019 **Givens Associate**, *Argonne National Laboratory*.
- Worked with Dr. Wendy Di on the multilevel Lennard-Jones problem which explored the creation of a multigrid inspired method for accelerating the iterative optimization process for the Lennard-Jones problem

Summer 2017 **Visiting Scholar**, *International Centre for Theoretical Sciences - TIFR*.
- Worked with Dr. Vishal Vasan on a spectral methods toolbox for solving partial differential equations and boundary value problems using their integral forms on various domains (like on the unbounded real line using rational Chebyshev functions).

2015- 2016 **NPOL Project Assistant**, *Tata Institute of Fundamental Research- Centre for Applicable Mathematics*.
- Worked on 3-D tomographic algorithms for synthetic aperture sonar under Dr. Venky Krishnan and Dr. A.S. Vasudeva Murthy for the Naval Physical and Oceanic Laboratory (NPOL).
- Worked with Dr. Praveen Chandrashekar on well-balanced schemes for Euler equations with gravity (describing various gas dynamics).

WORK EXPERIENCE

2022 -2023 **Data Science Consultant**, *Buffett Institute, Northwestern University*.
Developed an automated software tool for tagging Northwestern course descriptions with their UN sustainable development goals using a PyTorch-based text classifier and keyword matching. Currently working as a consultant improving this software and creating new ones for customizable web scraping.

2021- 2022 **Graduate Assistant**, *Buffett Institute, Northwestern University*.

As a Buffett GA, I organized and facilitated Idea Dialogues and Idea Incubation workshops (IIWs), bringing together faculty from different departments at Northwestern to find interdisciplinary solutions to global problems. Some of the IIW groups I have worked with

- "Language Curricula and Gender"
- "Disaster Preparedness"
- "AI and Social Movements"
- "Data and Justice"

2019- 2020 **Graduate Teaching Assistant**, *Northwestern University*.

Worked as a Teaching Assistant for

- MATH 228 - Multivariate Calculus
- MATH 252 - Honors Calculus (View course content developed)

2016-2018 **Graduate Teaching Assistant**, *University of Washington*.

Worked as a Teaching Assistant for

- AMATH 351 - Differential Equations (View course content developed)
- PHY 121 - Mechanics Laboratory
- AMATH 301 - Beginning Scientific Computing
- STAT 311 - Essentials of Statistical Methods

June - Dec 2014 **Noise, Vibration and Harshness Team**, *Altair Engineering*.

- Created Build Verification Tests for Altair's Noise Vibration and Harshness Director.
- Created post-processing utilities for Altair's HyperView.

Summer 2013 **Summer Intern**, *Madras Atomic Power Station*

- Worked on the analysis of piston ring failure in compressors using 10 years of data and setup a framework for early warning systems for preventive maintenance.

PUBLICATIONS AND PROCEEDINGS

1. "Explicit complex time integrators for stiff problems." Jithin D. George, Julian Koellermeier, Samuel Y. Jung, Niall M. Mangan. Accepted (Oct 2026) at **Communications in Applied Mathematics and Computational Science (CAMCOS)** arXiv:2601.07730 .

2. Jithin D. George, Willa Brenneis, Vinod K. Sangwan, Dilara Meli, Heather Kurtz, Jeffrey Richards, Lincoln J. Lauhon, Jonathan Rivnay, Mark C. Hersam, Jeffrey Lopez, Maria K. Y. Chan and Valerie Taylor. "Robust interpretation of electrochemical impedance spectra using numerical complex analysis." **ACS Measurement Science Au** (2025). https://doi.org/10.1021/acsmeasuresciau.5c00151

3. Jung, Jaeyoung K., Kathleen S. Dreyer, Kate E. Dray, Joseph J. Muldoon, Jithin D. George, Sasha Shirman, Maria D. Cabezas et al. "Developing, Characterizing, and Modeling CRISPR-Based Point-of-Use Pathogen Diagnostics." **ACS Synthetic Biology** (2024). https://doi.org/10.1016/j.jcat.2022.08.025

4. Brianna N. Ruggiero, Kenzie M. Sanroman Gutierrez, Jithin D. George, Niall M. Mangan, Justin M. Notestein, and Linsey C. Seitz. "Probing the Relationship Between Bulk and Local Environments to Understand Impacts on Electrocatalytic Oxygen Reduction Reaction." **Journal of Catalysis** (2022). https://doi.org/10.1016/j.jcat.2022.08.025

5. Jithin D. George, and Zichao Wendy Di. "Trilateration-Based Multilevel Method for Minimizing the Lennard-Jones Potential." In **International Conference on Computational Science**, pp. 163-175. Springer, Cham, 2020. https://doi.org/10.1007/978-3-030-50426-7_13

6. Jithin D. George, David I. Ketcheson, and Randall J. LeVeque. "Shoaling on steep continental slopes: Relating transmission and reflection coefficients to Green's law." **Pure and Applied Geophysics** 177.3 (2020): 1659-1674. https://doi.org/10.1007/s00024-019-02316-y

7. Jithin D. George, David I. Ketcheson, and Randall J. LeVeque. "A Path-Integral Method for Solution of the Wave Equation with Continuously Varying Coefficients." **SIAM Journal on Applied Mathematics** 79.6 (2019): 2615-2638. https://doi.org/10.1137/19M1238630

8. “A Visual Way to Teach the Fast Fourier Transform”, Jithin D. George. **SIAM News** (Nov. 2018)
(*Third most popular SIAM News article in 2018*)
https://sinews.siam.org/Details-Page/a-visual-way-to-teach-the-fast-fourier-transform

9. Jagtap, Ameya D., Esha Saha, Jithin D. George, and AS Vasudeva Murthy. "Revisiting the inhomogeneously driven sine–Gordon equation." **Wave Motion** 73 (2017): 76-85.
https://doi.org/10.1016/j.wavemoti.2017.05.003

10. Biswal, Sailendu, Jithin Donny George, and G. R. Sabareesh. "Fault size estimation using vibration signatures in a wind turbine test-rig." **Procedia Engineering** 144 (2016): 305-311.
https://doi.org/10.1016/j.proeng.2016.05.137.

11. Saxena, Ashish, and Jithin Donny George. "Numerical study on displacement of dielectric film composed of array of differently shaped elements for capacitance based MEMS sensors." **2016 International Conference on Microelectronics, Computing and Communications (MicroCom)**. IEEE, 2016.
https://doi.org/10.1109/MicroCom.2016.7522489.

PREPRINTS AND ARTICLES UNDER PREPARATION

1. "Coherent control in phase space: protocol design via optimal transport" Jithin D. George, Sraddha Agrawal, Stephen K. Gray, Emil Constantinescu, Pierre Darancet . In preparation.

2. "Mathematical modeling and numerical simulation of the electrocatalytic reaction environment for the Oxygen Reduction Reaction (ORR)" Jithin D. George, Yash Deodhar, Brianna N. Ruggiero, Linsey C. Seitz., Niall M. Mangan . In preparation.

3. "Probing ultrafast charge trapping dynamics in BBL" Gerrit Christenson, Angel Ivan Rodriguez-Leon, Jithin D. George, Valerie Taylor, Maria K. Y. Chan , Monica Olvera de la Cruz and James Gaynor . In preparation.

4. "Towards accessible and agentic approaches for the analysis and interpretation of EIS data", Jithin D. George, Priscilla Cavassin, Beliz Utebay, Jonathan Rivnay, Maria K. Y. Chan and Valerie Taylor . In preparation.

5. "Analog implementation of Kolmogorov-Arnold Networks using mixed-kernel heterojunction transistors" Bessie Yang, Jithin D. George, Mark Hersam, Pierre Darancet. In preparation.

6. "Walking into the complex plane to ’order’ better time integrators" Jithin D. George, Samuel Y. Jung, Niall M. Mangan .
https://arxiv.org/abs/2110.04402

7. “How does a coin toss? A look under an asymptotic microscope” Jithin D. George.
https://arxiv.org/abs/1904.07101

FELLOWSHIPS AND AWARDS

- **2025 Rising Star in Computational and Data Sciences** hosted by UT Austin’s Oden Institute for Computational Engineering and Sciences, the Santa Fe Institute, and Los Alamos, Lawrence Livermore, and Sandia National Laboratories.
- **2022-2023 Global Impacts Graduate Fellowship** from the Northwestern Buffett Institute for Global Affairs for scholarship related to Northwestern Buffett’s mission of exploring and addressing global challenges
- **Joseph Hammack Endowment Award** for exemplary work by a student in the Department of Applied Mathematics at the University of Washington.
- Recipient of **NSF-Mathematical Sciences Graduate Internship** at National Renewable Energy Laboratory.
- Recipient of **Givens Associate Internship** at Argonne National Laboratory.
- **Merit-Cum-Need Scholarship** throughout undergraduate study at BITS-Pilani.
- **Indian High Commissioner’s Gold Medal** from the Indian Ambassador to Tanzania.
- Silver medal in general knowledge in the **NCERT National Talent Search Examination** conducted throughout India.
- Silver medal in mathematics in the **NCERT National Talent Search Examination** conducted throughout India.

STUDENT RESEARCH SUPERVISION

- **Samuel Jung** (Undergrad, Northwestern University 2023) - *Developing novel complex time integrators* (from 2021-2022). Samuel received the Fletcher Award for Rising Undergrad Research Star for his work on this project. Currently pursuing Ph.D. in Computational electromagnetics at UIUC.
- **Yash Deodhar** (Masters in Applied Math, Northwestern University 2024) - Project: *Modeling and simulation for the Oxygen Reduction Reaction* (from 2024-2026). Currently pursuing Ph.D. in Applied Math at UC-Merced.
- **Bessie Yang** (Masters in Material Science, Northwestern University 2027) - Project: *Analog implementation of Kolmogorov-Arnold Networks* (from 2025-2027).

SERVICE TO VARIOUS COMMUNITIES

- **Scio Foundation** (2012 – 2015). Served as Editor-In-Chief. My main responsibilities were writing articles and organizing events to expose Indian high schoolers to various careers and the paths to reach them. We would travel to different town and localities in Telangana to talk with parents and schools about the importance of higher education especially for girls, distribute these articles and invite them to events at our University
- **SIAM Chapter at UW** (2016-2018). Volunteer for events like Math Fair where we travel to a local school and engage the students in math and critical-thinking activities.
- **SIAM Chapter at Northwestern** (2018-) (https://siam-northwestern.github.io/) Involved in the Northwestern Chapter since 2018. Served as the vice-president of the Northwestern chapter from 2020-2021. Served as the president of the Northwestern Chapter from 2021-2022 and received the 2021 SIAM Student Chapter Certificate of Recognition . Some of the activities we do, including some that I started:
  - We organize the Chicago Area SIAM Student Conference every year with IIT and UIC.
  - We have the SIAM Applied Math Journal Club at Northwestern which I started in 2019 for students to learn about new topics, methods and brainstorm about their research.
  - Coffee/Cider with undergrads
  - The Math Jam hours
  - The Bridging the Gap seminars

OTHER SELECTED PROJECTS

- **Estimating speech from lip dynamics** (with Ronan Keane and Conor Zellmer) *UW (AMATH 582), Winter 2017*.
- **Gene expression exploration through fMRI data analysis** (with Dr. Nina De Lacy) *Seattle Children's Hospital, 2016*.
- **Condition monitoring of a wind turbine test rig and fault prediction**(with S. Biswal and G. Sabareesh) *BITS-Pilani, 2015*.
- **Design of a novel wall-climbing robot** *BITS-Pilani, 2013*.
- **Development of an image processing prototype called "Lazy Mouse"** *MIT Media Lab Design Innovation Workshop, 2014*.
- **Modeling and simulation of a prosthetic socket** (with Dr. S.P Regalla) *BITS-Pilani, 2014*.

Skills

Programming
Python • C (MPI and Cuda) • Julia• Matlab • Fortran • R • TCL • LaTeX•

Software
HyperWorks• COMSOL • Creo • SPSS • CATIA