Nicholas C. Dorn

PhD Candidate — Computational Cardiovascular Biomechanics
ncdorn@stanford.edu | (310) 694-7446
github.com/ncdorn | ncdorn.github.io | linkedin.com/in/ndorn22

Education

Ph.D., Chemical Engineering Stanford University, Expected 2026
Relevant Coursework: Microhydrodynamics, Applied Math in Bio/Chemical Sciences, Machine Learning for Computational Engineering, Computational Biology

M.S., Chemical Engineering Stanford University, 2025

B.S., Chemical Engineering UC San Diego, 2022
Minor in Mathematics GPA: 3.82
Relevant Coursework: Biomaterials Design, Nanoengineering in Medicine, Thermodynamics, Reaction Engineering (MATLAB), Fluid Mechanics

Research Experience

Cardiovascular Biomechanics Computation Lab, Stanford University **Apr 2023 – Present**

PhD Candidate — Research on computational hemodynamics in the pulmonary circulation: coupling 3D computational fluid dynamics with 0D/1D LPN models, structured-tree microvascular boundary conditions, and microvascular adaptation models for predictive surgery planning.

Shaqfeh Lab, Stanford University **Jan 2023 – Mar 2023**

Rotation Student — Simulated spinning geometries in viscoelastic fluids using Oldroyd-B model; derived second-order perturbation theory in Deborah number.

DeSimone Lab, Stanford University **Sep 2022 – Dec 2022**

Rotation Student — Designed dip-coating masks and microchannel systems in Fusion 360 to fill microneedle patches; prototyped 3D-printed arrays.

Shah Lab, UC San Diego **Sep 2019 – Jun 2022**

Undergraduate Researcher — Published first author paper with over 30 citations. Led projects on SCFA delivery systems for inflammatory disease; used in vitro culture, flow cytometry, ELISA, and mouse models. Built cytokine-driven Python model of RA.

Technical Projects

svZeroDTrees — Generator and simulator for structured-tree microvascular models.
(Python, Pandas, VTK) — Synthesizes physiologic impedance/waveforms for patient-specific CFD.

svZeroDSolver — 0D solver for cardiovascular lumped-parameter networks.
(C++, Python) — Developed adaptation solvers, boundary condition tuning, waveform synthesis modules.

PacerBrain — Personalized pacing/fueling app for triathletes.
(SwiftUI, CoreData) — Built and deployed iOS app that models race strategies from athlete physiology.

Publications

- K. Menon*, J. Richter*, M. R. Pfaller*, J. Pham, E. M. Mathew, K. E. Harold, **N. C. Dorn**, A. Verma, A. L. Marsden, "svZeroDSolver: A modular package for lumped-parameter cardiovascular simulations", *Journal of Open Source Software*, 2025. https://doi.org/10.21105/joss.07595

- **N. Dorn**, J. Szafron, C. DeShetler, F. Taha, C. Breuer, J. Kelly, A. Marsden, *Comparative CFD analysis of pulmonary hemodynamics in a sheep model of Fontan circulation*, In preparation, 2025.

- **N. Dorn**, B. Li, J. Szafron, A. Marsden, *Modeling vascular adaptation for prediction of surgical outcomes in peripheral pulmonary artery stenosis repair*, In preparation, 2025.

- David A. McBride*, **Nicholas C. Dorn***, Mina Yao, Wade T. Johnson, Wei Wang, Nunzio Bottini, Nisarg J. Shah, "Short-chain fatty acid-mediated epigenetic modulation of inflammatory T cells in vitro", *Drug Delivery and Translational Research*, 2022. https://doi.org/10.1007/s13346-022-01284-6

- Wade T. Johnson, **Nicholas C. Dorn**, Dora A. Ogbonna, Nunzio Bottini, Nisarg J. Shah, "Lipid-based regulators of immunity", *Bioengineering & Translational Medicine*, 2021. https://doi.org/10.1002/btm2.10288

- David A. McBride, Matthew D. Kerr, **Nicholas C. Dorn**, Dora A. Ogbonna, Evan C. Santos, Nisarg J. Shah, "Triggers, Timescales, and Treatments for Cytokine-Mediated Tissue Damage", *European Medical Journal Innovations*, 2020. https://doi.org/10.33590/emjinnov/20-00203

- David A. McBride, Matthew D. Kerr, Wade T. Johnson, Anders Nguyen, Martina Zoccheddu, Mina Yao, Edward B. Prideaux, **Nicholas C. Dorn**, Wei Wang, Mattias N.D. Svensson, Nunzio Bottini, Nisarg J. Shah, "Immunomodulatory microparticles epigenetically modulate T cells and systemically ameliorate autoimmune arthritis", *Advanced Science*, 2023. https://doi.org/10.1002/advs.202202720

Talks & Posters

- "Comparative CFD Analysis of Pulmonary Hemodynamics in a Sheep Model of Fontan Circulation", Talk, CMBBE 2025 — Barcelona, Spain.

- "Modeling Vascular Adaptation for Surgical Outcomes", Poster, Gordon Research Conference 2025 — Ventura, CA.

- "Epigenetic Modulation of T-cells in Inflammatory Disease", Talk, UCSD Summer Research Conference, 2021.

- "Epigenetic Modulation of Inflammatory T cells", Talk, AIChE Annual Meeting, 2020.

- "Epigenetic Modulation of Inflammatory T cells", Poster, BMES Annual Meeting, 2020.

- "Engineering Anti-inflammatory Biomaterials for Gut Autoimmune Disorders", Talk, UCSD Online Symposium, 2020.

Awards & Honors

- NSF Graduate Research Fellowship, 2022–2025
- Tau Beta Pi Engineering Honor Society
- Ledell Family Summer URS Fellowship for Science and Engineering
- Academic Excellence Award, UCSD Recreation (2x)
- Triton Research and Experiential Learning Scholar

Leadership Experience

Vice President, Project Bluewater Racing Oct 2023-Present
Nonprofit cleaning up San Diego waterways and providing tuition-free science and sailing education to 100 students. Improved website user data capturing + CRM integration.

President, UCSD Sailing Team Apr 2020 – Jun 2022
Managed 40-athlete team logistics, race strategy, maintenance, and COVID-compliant practice plans.

Program Manager, AIChE Projects at UCSD May 2019 – Jun 2022
Directed 6 student-led project teams; organized events and fundraisers with >100 participants.

Project Manager, Fuel Cell Design Team Apr 2020 – Sep 2021
Led research on metal hydrides and CAD/Fusion360-based prototyping for hydrogen storage.

Skills

Programming: Python, C++, Swift, MATLAB, Git, bash
Modeling/Tools: SimVascular, 0D/1D LPN, CFD, VTK, Doxygen, Fusion 360, Tecplot
Wet Lab: Cell culture, flow cytometry, ELISA, cytokine assays, murine models
Soft Skills: Scientific writing, project leadership, public speaking