

Roger Rowe PhD

Mechanical Engineer

Product Development · Engineering Leadership · Biomechanics · Computational Modeling

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HIGHLIGHTS

Mechanical engineer with a PhD in mechanics and four years as the lead — and often sole — engineer at an early-stage endovascular catheter startup. Owned engineering operations end to end: device design, benchtop testing, preclinical study support, ISO 13485 design controls, IP strategy, and direct contribution to executive and investor-facing materials. Equally comfortable at the bench, in a CAD tool, and in a board meeting.

- Five years of hands-on three-dimensional tissue culture and mechanical testing during doctoral work at the Washington University School of Medicine (Department of Biochemistry and Molecular Biophysics), with postdoctoral extension at the NSF Center for Engineering Mechanobiology; first-author publications in Biophysical Journal (2015) and Mechanics of Soft Materials (2019) on mechanobiology and viscoelastic characterization of cell-populated collagen constructs, with co-authored work in ACS Nano, Journal of Biomechanical Engineering, Scientific Reports, and Journal of Vascular Surgery.
- Lead engineer at Caeli Vascular (2021–2025). Translated engineering progress and technical risk into board and investor materials supporting \$2M in grant funding and \$4.2M in seed financing; served as the engineering point of contact for investor due diligence through ongoing Series A interest from a top-five global medical device company.
- Direct working knowledge of the full medical device development stack: ISO 13485 design controls, IP strategy with outside patent counsel, preclinical study design, regulatory documentation, and engineering support for investor due diligence through Series A interest from a top-five global medical device company.
- Breadth across the full development cycle — from governing equations and computational modeling through hands-on fabrication, benchtop testing, and preclinical execution — paired with the communication skills to translate technical work for executives, investors, and outside counsel in the same week.
- Active work in scientific machine learning: manuscript in preparation with Dr. Guy Genin (Washington University) on physics-informed neural networks for inverse load identification in structural mechanics, with applications to biological and vascular mechanics.

TECHNICAL EXPERIENCE

Caeli Vascular | St. Louis, MO

2021 – 2025

Engineering Manager · Development Engineer III

Lead engineer at an early-stage endovascular medical device startup developing thrombectomy devices for acute deep venous thrombosis. Primary engineering authority within the organization; work directly informed \$2M in grant funding and \$4.2M in seed financing, with ongoing Series A interest from a top-five global medical device company.

- Translated engineering progress, test data, and technical risk into board and investor materials; served as the engineering point of contact for investor due diligence; advised leadership on technical strategy.
- Led the engineering side of IP strategy: translated device concepts and test results into defensible patent filings, owned technical documentation, worked directly with outside counsel.
- Designed a novel experimental protocol and built the custom imaging and analysis system to quantify clot fragmentation in candidate thrombectomy devices. Replaced a flawed filter-based method; improved data integrity; enabled rapid iteration before pivotal animal studies.

- Designed and delivered a functional catheter aspiration system on a one-month deadline tied to scheduled animal studies; integrated off-the-shelf components with custom SolidWorks hardware.
- Spearheaded concept, prototypes, and IP for a modular multi-tool thrombectomy platform addressing diverse clot morphologies; progress reinforced ongoing Series A interest.
- Served as Caeli-side technical lead on a development relationship with an external contract engineering firm, coordinating device- and component-level work and integrating their output into Caeli's development program.
- Operated within an ISO 13485-compliant quality management system, requiring adherence to structured design controls and documentation practices.

Null Aerospace | St. Louis, MO

2020

Engineer

Contributed to the launch of a CNC aerospace job shop. Executed full manufacturing workflow from customer drawings through SolidWorks modeling, fixture design, SolidCAM programming, and CNC setup and machining of precision aerospace components. Helped establish core infrastructure (machine selection, software evaluation, workflow definition).

NSF Center for Engineering Mechanobiology | St. Louis, MO

2018-2020

Postdoctoral Fellow

Applied inverse methods and regularization, the mathematical foundation underneath modern machine learning, to biological systems within an NSF-funded interdisciplinary research center.

- Extended stable viscoelastic spectrum methods to plant tissue characterization, enabling recovery of 100+ spectrum parameters from stress relaxation data, in support of climate-change crop research.
- Mentored graduate students in experimental design and quantitative analysis; supervised undergraduate independent research.

Washington University in St. Louis | St. Louis, MO

2012-2018

McDonnell Scholar · PhD Candidate

Doctoral research in nonlinear viscoelasticity, tissue mechanics, and inverse methods, conducted in the Department of Biochemistry and Molecular Biophysics at the Washington University School of Medicine. Advised by Dr. Elliot Elson.

- Conducted five years of hands-on three-dimensional tissue culture, including fabrication of cell-populated collagen constructs with primary fibroblasts and cardiomyocytes, stress relaxation testing on living and contractile tissues, and characterization of how subcellular structure shapes tissue-level mechanical behavior across length scales.
- Identified and mathematically demonstrated that experimental noise produces unbounded solutions in viscoelastic spectrum estimation from stress relaxation data; developed and published a principled regularization-based method enabling stable high-resolution characterization with 100+ parameters.
- Developed original MATLAB analysis tools for stress relaxation experiments on active tissue constructs.
- Assisted teaching mechanics courses including Dynamics, Vibrations, Mechanics of Materials, Continua, and Elasticity; mentored mechanical engineering undergraduates.
- Presented technical research domestically and internationally including through the McDonnell International Scholars Academy, whose purpose is to develop graduate students across disciplines for leadership roles. Audiences spanned engineering, medicine, business, arts and sciences, and social sciences, requiring translation of inverse-problem and viscoelastic work across disciplinary boundaries.
- Elected by department leadership to serve on the Graduate Council, first as a departmental student representative and later on the Graduate Council Executive Board.

Nomad Global Communication Solutions | Columbia Falls, MT

2009-2011

[Shop Technician](#) · [Lead Shop Technician](#) · [Lead 12V Technician](#)

Custom fabrication of mobile command centers and medical vehicles for government clients. Advanced from generalist to project 12V systems lead, bridging production floor, engineering, and purchasing. Led a multidisciplinary build team through the company's first on-time project in eight years (mobile dental vehicle, Florida Department of Health). Project lead on U.S. Army Corps of Engineers mobile command centers.

Washington University in St. Louis | St. Louis, MO

2007

[Undergraduate Research Assistant](#)

Developed a continuum-based displacement tracking algorithm for traction microscopy, enabling measurement of cell-generated forces on highly compliant substrates where large deformations made conventional particle-tracking methods ineffective. Presented at BMES Annual Meeting 2007, Los Angeles.

Princeton University | Princeton, NJ

2006

[Undergraduate Research Assistant](#)

Conducted optical experiments and MATLAB-based data analysis of dispersive shock wave dynamics in nonlinear optical systems used as analogs for inviscid fluid behavior.

EDUCATION

Washington University in St. Louis | St. Louis, MO

[PhD, Mechanical Engineering, 2018](#)

Dissertation: Stable Estimation of Viscoelastic Spectra
McDonnell International Scholars Academy Fellowship

[MS, Mechanical Engineering, 2015](#)

Specialization: Applied Mechanics
McDonnell International Scholars Academy Fellowship

[BS, Mechanical Engineering, 2007](#)

Magna Cum Laude
Tau Beta Pi, Pi Tau Sigma

Willamette University | Salem, OR

[BA, Physics, 2007](#)

Cum Laude

TECHNICAL SKILLS

Software & Programming

SolidWorks · SolidCAM · MATLAB/Simulink · Python · PyTorch · COMSOL Multiphysics · LabVIEW · MS Office

Platforms

Windows · Linux (Debian and Arch) · macOS

OTHER EXPERIENCE

Alpine Boardsports | Phoenix, AZ

2011-2012

- Led online sales and customer service operations, serving as the primary point of contact for customers while also working the retail floor and performing technical service and repair of ski and snowboard equipment.

- Managed day-to-day operations of photographic laboratory and camera store, overseeing chemical maintenance, quality control, sales, customer service, inventory management and purchasing; hired, trained, and supervised seasonal staff.

- Taught cross-country skiing to individuals and groups, monitored trail conditions and access, and adjusted trail routing based on snowpack; serviced and repaired ski equipment in rental and retail operations.

SELECTED PUBLICATIONS

Pryse KM, **Rowe RA**, Benegal A, Derami HG, Vahey M, Singamaneni S, Elson EL, Genin GM. "Reflectance correlation spectroscopy for label-free, single-particle measurement of nanoparticle size, aspect ratio, and concentration in solution." *Nature Methods*, 2026. **In preparation.**

Rowe RA, Genin GM. "Physics-informed Neural Networks for Cantilever Beam Load Recovery from Sparse Noisy Sensors Arrays." *Proceedings of the Royal Society of London*, 2026. **In preparation.**

Long F, **Rowe RA**, Genin GM. "A Resolution-Matrix Framework for Viscoelastic Spectral Estimation in Soft Biological Tissues." *Journal of the Mechanics and Physics of Solids*, 2026. **In preparation.**

Arif B, Hafezi S, Ismail U, Meade R, Roberts SH, **Rowe R**, et al. "Venous Microtrauma Associated with Pharmacomechanical Thrombectomy in A Porcine DVT Model." *Journal of Vascular Surgery*, 2024.

Ismail U, **Rowe RA**, Cashin J, Genin GM, Zayed MA. "Multimodal thrombectomy device for treatment of acute deep venous thrombosis." *Scientific Reports*, 12, 5295, 2022.

Shakiba D, Alisafaei F, Savadipour A, **Rowe RA**, Liu Z, Pryse KM, Shenoy VB, Elson EL, Genin GM. "The Balance between Actomyosin Contractility and Microtubule Polymerization Regulates Hierarchical Protrusions That Govern Efficient Fibroblast-Collagen Interactions." *ACS Nano*, 14(7), 2020.

Rowe RA, Pryse K, Elson E, Genin GM. "Stable fitting of noisy stress relaxation data." *Mechanics of Soft Materials*, 2019.

Boyle JJ, Soepriatna A, Damen F, **Rowe RA**, Pless RB, Kovacs A, Goergen CJ, Thomopoulos S, Genin GM. "Regularization-Free Strain Mapping in Three Dimensions, With Application to Cardiac Ultrasound." *Journal of Biomechanical Engineering*, 2019.

Rowe RA, Pryse KM, Asnes CF, Elson EL, Genin GM. "Collective matrix remodeling by isolated cells: unionizing home improvement do-it-yourselfers." *Biophysical Journal*, 108(11), 2015.