

VIKAS SRIVASTAVA

School of Engineering, Brown University, 184 Hope Street, Providence, RI 02912
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RESEARCH INTERESTS

Srivastava Research Group focuses on developing and applying continuum-scale solid mechanics theories, models, and experiments for engineering materials and biomedical systems.

EDUCATION

- Ph.D.** Mechanical Engineering, Massachusetts Institute of Technology 2005 – 2010
Minor in Finance, Sloan School of Management, M.I.T.
- M. S.** Mechanical Engineering and Applied Mechanics, University of Rhode Island 1998 – 1999
- B. Tech.** Mechanical Engineering, Indian Institute of Technology, Kanpur 1994 – 1998

PROFESSIONAL APPOINTMENTS

- Associate Professor of Engineering (*with tenure*) 2024 – present
School of Engineering, *Brown University*, Providence, RI
- Director of Graduate Program for Biomedical Engineering 2024 – present
Institute of Biology, Engineering, and Medicine, *Brown University*, Providence, RI
- Howard M. Reisman Assistant Professor of Engineering 2021 – 2024
School of Engineering, *Brown University*, Providence, RI
- Tenure Track Assistant Professor of Engineering 2018 – 2021
School of Engineering, *Brown University*, Providence, RI
- Mechanics Team Lead and Fitness for Service Research Area Lead 2017 – 2018
ExxonMobil Upstream Research, Spring, TX
- Senior Technical Professional Advisor – Mechanics of Materials 2017 – 2018
ExxonMobil Upstream Organizations (Exploration, Development and Production), Spring, TX
- Advisory Board Member, High-Pressure High-Temperature Subsea Systems 2017 – 2018
DeepStar Global Offshore Technology Development Consortium, Houston, TX
- Advanced Research Associate 2015 – 2016
ExxonMobil Corporate Strategic Research, Clinton, NJ
- Marine Team Lead 2013 – 2014
ExxonMobil Upstream Research, Houston, TX
- Worldwide Deepwater Drilling Engineering Coordinator 2012 – 2013
ExxonMobil Upstream Research, Houston, TX
- Senior Research Engineer – Subsea and Arctic 2010 – 2012
ExxonMobil Upstream Research, Houston, TX
- Engineering Group Leader – High-speed Turbomachinery 2003 – 2005
KMC, Inc., W. Greenwich, RI

- Project and R&D Engineer – High-speed Turbomachinery
KMC, Inc., W. Greenwich, RI

2000 – 2002

HONORS AND AWARDS

- Dean's Award in Bioengineering 2024
- Dean's Award for Excellence in Teaching in Engineering, Brown University 2023
- Brown Biomedical Innovations to Impact Award 2022
- Howard M. Reisman '76, P'09 Inaugural Endowed Chair 2021
- Brown Office of the Vice President of Research Seed Award 2021
- Richard B. Salomon Faculty Research Award, Brown University 2020
- Advisor to Novel Idea Team, ExxonMobil Upstream Global Intellectual Property 2017
- Senior Technical Professional Advisor (one for all upstream companies), ExxonMobil 2017

PEER-REVIEWED JOURNAL PUBLICATIONS

*Corresponding author

Kottila, V.V., Parambil, N.K., and **Srivastava, V.***, Hygroscopic damage of fiber-matrix interface in unidirectional composites: A computational approach, *International Journal of Mechanics Sciences*, 279, 109460, 2024.

<https://doi.org/10.1016/j.ijmecsci.2024.109460>

Ahmed, Z., LoGiudice, K., May, G. Schorr, A., Rowey, R., Yang, H., Trivedi, S., and **Srivastava, V.***, Increasing Chemotherapeutic Efficacy Using pH-Modulating and Doxorubicin-Releasing Injectable Chitosan-Poly(ethylene glycol) Hydrogels, *ACS Applied Materials & Interfaces*, 15, 45626-45639, 2023.

<https://doi.org/10.1021/acsami.3c09733> *Brown University News*: <https://www.brown.edu/news/2023-09-20/hydrogel>

Konale, A., Ahmed, Z., Wanchoo, P. and **Srivastava, V.***, A large deformation model for quasi-static to high strain rate response of a rate-stiffening soft polymer, *International Journal of Plasticity*, 168, 103701, 2023.

<https://doi.org/10.1016/j.ijplas.2023.103701>

Niu, S., Zhang, E., Bazilevs, Y., and **Srivastava, V.***, Modeling finite-strain plasticity using physics-informed neural network and assessment of the network performance, *Journal of the Mechanics and Physics of Solids*, 172, 105117, 2023.

<https://doi.org/10.1016/j.jmps.2022.105177>

Machnicki, C. E., DuBois, E.M., Fay, M., Hruska, A.M., Ahmed, Z., Shrestha, S., Saleeba, Z.S., **Srivastava, V.**, Chen, P.Y., and Wang, I.*, Graphene oxide nanosheets augment silk fibroin aerogels for enhanced water stability and oil adsorption, *Nanoscale Advances*, 2023.

<https://doi.org/10.1039/d3na00350g>

LaJoie, Z., Usherwood, T., Sampath, S., and **Srivastava, V.***, A COVID-19 model incorporating variants, vaccination, waning immunity, and population behavior, *Scientific Reports*, 12(1), 20377:1-11, 2022.

<https://www.nature.com/articles/s41598-022-24967-z>

Niu, S., and **Srivastava, V.***, Simulation trained CNN for accurate embedded crack length, location, and orientation prediction from ultrasound measurements, *International Journal of Solids and Structures*, 242, 111521, 2022.

<https://doi.org/10.1016/j.ijsolstr.2022.111521>

Brown School of Engineering News: <https://engineering.brown.edu/news/2022-12-08/vikas-convolutional-neural>

Niu, S., and **Srivastava, V.***, Ultrasound classification of interacting flaws using finite element simulations and convolutional neural networks, *Engineering with Computers*, 38(5), 4653-4662, 2022.

<https://doi.org/10.1007/s00366-022-01681-y>

Sampath, S.G., Telfeian, A.E., Sullivan, R., Lu, A., and **Srivastava, V.***, Shape Memory Nitinol Based Minimally Invasive Spinal Cord Stimulation Device Concept for Improved Pain Management, *Pain Physician*, 25:E375-E383, 2022.

<https://www.painphysicianjournal.com/linkout?issn=&vol=25&page=E375>

Klinge, P. M.*, **Srivastava, V.**, McElroy, A., Leary, O., Ahmed, Z., Donahue, J.E., Brinker, T., DeVloo, P., and Gokaslan, Z.L., Diseased filum terminale as a cause of tethered cord syndrome in Ehlers Danlos syndrome: histopathology, biomechanics, clinical presentation, and outcome of filum excision, *World Neurosurgery*, 2022. <https://doi.org/10.1016/j.wneu.2022.03.038>

Malhotra, P. *, Niu, S., **Srivastava, V.**, and Guduru, P.R., A Technique for High-Speed Microscopic Imaging of Dynamic Failure Events and Its Application to Shear Band Initiation in Polycarbonate, *Journal of Applied Mechanics*, 89(4), 041001: 1-18, 2022. <https://doi.org/10.1115/1.4053080>

Zhong, J. and **Srivastava, V.***, A higher-order morphoelastic beam model for tubes and filaments subjected to biological growth, *International Journal of Solids and Structures*, 233, 111235: 1-11, 2021. <https://doi.org/10.1016/j.ijsolstr.2021.111235>

Usherwood, T., LaJoie, Z., and **Srivastava, V.***, A model and predictions for COVID-19 considering population behavior and vaccination, *Scientific Reports*, 11(1), 12051: 1-11, 2021. <https://www.nature.com/articles/s41598-021-91514-7> *Brown University News*: <https://www.brown.edu/news/2021-06-10/model>

Bai, Y., Kaiser, N.J., Coulombe, K.L.K., and **Srivastava, V.***, A continuum model and simulations for large deformation of anisotropic fiber-matrix composites for cardiac tissue engineering, *Journal of the Mechanical Behavior of Biomedical Materials*, 121, 104627: 1-12, 2021. <https://doi.org/10.1016/j.jmbbm.2021.104627>

Shukla, S., Favata, J., **Srivastava, V.**, Shahbazmohamadi, S., Tripathi, A., and Shukla, A. *, Effect of polymer and ion concentration on mechanical and drug release behavior of gellan hydrogels using factorial design, *Journal of Polymer Science*, 58(10), 1365-1379, 2020. <https://doi.org/10.1002/pol.20190205>

Kothari, M., Niu, S., and **Srivastava, V.***, A thermo-mechanically coupled finite strain model for phase-transitioning austenitic steels in ambient to cryogenic temperature range, *Journal of the Mechanics and Physics of Solids*, 133, 103729: 1-15, 2019. <https://doi.org/10.1016/j.jmps.2019.103729>

Gordon, P. *, Liu, F., Meier, H., Panchadhara, R., and **Srivastava, V.**, A material point method for simulation of viscoelastic flows, *Computational Particle Mechanics*, 6(3), 311–325, 2019. <https://doi.org/10.1007/s40571-018-0215-6>

Jena, R.K., Chester S.A., **Srivastava, V.**, Yue, C.Y. *, Anand, L., and Lam, Y.C., Large-strain thermo-mechanical behavior of cyclic olefin copolymers: application to hot embossing and thermal bonding for the fabrication of microfluidic devices, *Sensors and Actuators B: Chemical*, 155(1), 93–105, 2011. <https://doi.org/10.1016/j.snb.2010.11.031>

Srivastava, V., Chester, S.A., and Anand, L. *, Thermally-actuated shape-memory polymers: experiments, theory, and numerical simulations, *Journal of the Mechanics and Physics of Solids*, 58(8), 1100–1124, 2010. <https://doi.org/10.1016/j.jmps.2010.04.004>; *MIT News*: <https://news.mit.edu/2010/memory-polymer-1206>

Srivastava, V., Chester, S.A., Ames, N.M., and Anand, L. *, A thermo-mechanically coupled large-deformation theory for amorphous polymers in a temperature range which spans their glass transition, *International Journal of Plasticity*, 26(8), 1138–1182, 2010. <https://doi.org/10.1016/j.ijplas.2010.01.004>

Ames, N. M., **Srivastava, V.**, Chester, S.A., and Anand, L. *, A thermo-mechanically coupled theory for large deformations of amorphous polymers. Part II: Applications, *International Journal of Plasticity*, 25(8), 1495–1539, 2009. <https://doi.org/10.1016/j.ijplas.2008.11.005>

Anand, L. *, Ames, N. M., **Srivastava, V.**, and Chester, S.A., A thermo-mechanically coupled theory for large deformations of amorphous polymers. Part I: Formulation, *International Journal of Plasticity*, 25(8), 1474–1494, 2009. <https://doi.org/10.1016/j.ijplas.2008.11.004>

Henann, D., **Srivastava, V.**, Taylor, H.K., Hale, M.H., Hardt, D.E., and Anand, L.* , Metallic glasses: Viable tool materials for production of surface microstructures in amorphous polymers by micro-hot-embossing, *Journal of Micromechanics and Microengineering*, 19, 115030:1-10, 2009. <https://doi.org/10.1088/0960-1317/19/11/115030>

Srivastava, V., Parameswaran, V., Shukla, A.* and Morgan, D., Effect of loading rate and geometry variation on the dynamic shear strength of adhesive lap joints, *Recent Advances in Experimental Mechanics*, Refereed Special Technical Publication, Kluwer Academic Publishers, 769–780, 2002. https://doi.org/10.1007/0-306-48410-2_71

Srivastava, V., Parameswaran, V. and Shukla A.* , Experimental evaluation of the dynamic shear strength of the adhesive-bonded lap joints, *Journal of Testing and Evaluation*, 28(6), 438–442, 2000. <https://doi.org/10.1520/JTE12134J>

JOURNAL ARTICLES IN REVIEW

Niu, S., Bellala, V., Daanish, Q. and **Srivastava, V.***, A method to measure the embedded crack length and position in high-density polyethylene using microseconds ultrasound time signal, *under review*, 2024. <https://doi.org/10.48550/arXiv.2304.11497>

Konica, S., Sheldon, B., and **Srivastava, V.***, Role of coupled electrochemistry and stress on the Li-anode instability: A continuum approach, *under review*, 2024. <https://doi.org/10.48550/arXiv.2405.05837>

SELECTED CONFERENCE PROCEEDINGS

Kothari, M., Niu, S., and **Srivastava, V.**, Thermo-mechanically coupled model for phase transition in austenitic steels for low temperature applications, *25th International Congress of Theoretical and Applied Mechanics*, 2021

Niu, S., Back, W., and **Srivastava, V.**, Accurate NDT Characterization of Hidden Flaws with Mechanics and Machine Learning, *Proceedings of Pipeline Research Council International Research Exchange*, 2021

Thirumalai, N., **Srivastava, V.**, Hallai, J., Ma, N., Sarosi, P., Jun, H.J., and Baker, D., Hydrogen Permeation, Absorption and Trapping in Carbon Steels: A Comparison of Line Pipe and OCTG Steels, *Proceedings of the 29th International Ocean and Polar Engineering Conference*, 2019

Jun, H.J., **Srivastava, V.**, Ma, N., Sarosi, P., and Thirumalai, N., Measuring Crack Propagation Resistance of Line Pipe Steels in Sour Service – A Comparative Study of Test Methods and Materials Response, *Proceedings of the 29th International Ocean and Polar Engineering Conference*, 2019

Zheng, H., Slocum, S.T., Huang, J.Z., **Srivastava, V.**, Lee, S. and Wang, H.H., Numerical Analysis of Experimental Data of Subsea Jumper Vortex Induced Vibrations, *Proceedings of the ASME 34th International Conference on Ocean, Offshore and Arctic Engineering*, 2015

Srivastava, V., Hallai, J., Campbell, B., and Kokkinis, T., Dynamic response of submerged buoys disconnected at large vessel offsets, *Proceedings of Arctic Technology Conference*, 2014

Stright, S., **Srivastava, V.**, King, G., Smith, D.W., and Tears, N.C., Regeneration of first-generation subsea fields: the challenges of new wells in old infrastructure, *Society of Petroleum Engineers Drilling Conference Proceedings*, 2012

Srivastava, V., Buitrago, J., and Slocum, S.T., Stress analysis of a cryogenic corrugated pipe, *Proceedings of the ASME 30th International Conference on Ocean, Offshore and Arctic Engineering*, 2011

Chester, S.A., **Srivastava, V.**, and Anand, L., A thermo-mechanically-coupled theory for the damage and failure of amorphous polymers, *Proceedings of the SEM IMPLAST 2010 Conference*, 2010

Srivastava, V., and Anand, L., On modeling the mechanical behavior of amorphous polymers for the micro-hot-embossing of microfluidic devices, *Proceedings of ASME International Mechanical Engineering Congress & Exposition*, 2008

INVITED TALKS

Department of Mechanical Engineering, <i>University of Michigan</i> , Ann Arbor, MI	2023
Celebrating the 80 th Birthday of Thomas J.R. Hughes, <i>Advances in Computational Mechanics</i> , Austin, TX	2023
Aerospace Engineering & Mechanics, <i>University of Minnesota – Twin Cities</i> , Minneapolis, MN	2023
Society of Engineering Science Annual Technical Meeting, Minneapolis, MN	2023
Symposium in Honor of Prof. Arun Shukla's 70 th Birthday, <i>University of Rhode Island</i> , Kingston, RI	2023
Department of Civil and Environmental Engineering, <i>University of Southern California</i> , Los Angeles, CA	2023
College of Engineering Mechanics Seminar, <i>Georgia Institute of Technology</i> , Atlanta, GA	2023
Mechanical Engineering Mechanics Seminar, <i>Massachusetts Institute of Technology</i> , Cambridge, MA	2023
Mechanical Engineering Department Seminar, <i>Auburn University</i> , Auburn, AL	2023
CRUNCH Seminar, Division of Applied Mathematics, <i>Brown University</i> , Providence, RI	2023
<i>Keynote Speaker, 19th U. S. National Congress on Theoretical and Applied Mechanics</i> , Austin, TX	2022
Department of Mechanical Engineering, <i>Indian Institute of Technological</i> , Kanpur, India	2022
School of Mechanical and Aerospace Engineering, <i>Nanyang Technological University</i> , Singapore	2022
Department of Aerospace Engineering, <i>Indian Institute of Science</i> , Bengaluru, India	2022
Department of Mechanical Engineering, <i>Indian Institute of Science</i> , Bengaluru, India	2022
Mechanical Engineering Department, <i>Alliance University</i> , Bengaluru, India	2022
Mechanical Engineering – Engineering Mechanics, <i>Michigan Technological University</i> , Houghton, MI	2022
Department of Mechanical and Industrial Engineering, <i>New Jersey Institute of Technology</i> , Newark, NJ	2022
Sibley School of Mechanical and Aerospace Engineering, <i>Cornell University</i> , Ithaca, NY	2021
<i>Pipeline Research Council International Research Exchange</i> , Houston, TX	2021
<i>ExxonMobil Research and Engineering</i> , Spring, TX	2021
University Research Series, <i>Naval Underwater Warfare Research Center</i> , Newport, RI	2021
Department of Mechanical, Industrial and Systems Engineering, <i>University of Rhode Island</i> , RI	2020
Department of Orthopaedics, <i>The Warren Alpert Medical School of Brown University</i> , Providence, RI	2019
Metallurgical Engineering and Material Science, <i>Indian Institute of Technology</i> , Mumbai, India	2019
Department of Applied Mechanics, <i>Indian Institute of Technology</i> , Delhi, India	2019
Biomedical Engineering, School of Engineering, <i>Brown University</i> , Providence, RI	2018
Ocean Science and Engineering, <i>Massachusetts Institute of Technology</i> , Cambridge, MA	2016
<i>International Symposium on Plasticity</i> , Puerto Vallarta, Mexico	2011
Department of Mechanical Engineering, <i>Indian Institute of Technology</i> , Kanpur, India	2010
<i>Singapore Institute of Manufacturing Technology</i> , Singapore	2009
<i>ExxonMobil Upstream Research Company</i> , Houston, TX	2008
<i>Sensitron Semiconductor</i> , Hauppauge, NY	2008
<i>Intel Corporation</i> , Hillsboro, OR	2008

CONFERENCE PRESENTATIONS

- Konica, S., Sheldon, B., and **Srivastava, V.**, A mechanistic study of solid electrolyte interphase instability in Li metal anode batteries, *Society of Engineering Science Annual Technical Meeting*, Minneapolis, MN, 2023
- Konale, A., Zahra, A., Wanchoo, P. and **Srivastava, V.**, A large deformation model for quasi-static to high strain rate response of rate-stiffening soft polymers, *Society of Engineering Science Annual Technical Meeting*, Minneapolis, MN, 2023
- Kottila, V.V., Parambil, N.K., Guduru, P. and **Srivastava, V.**, Effect of water on unidirectional fiber-reinforced composite: a computational study, *Society of Engineering Science Annual Technical Meeting*, Minneapolis, MN, 2023
- Konale, A., Ahmed, Z., and **Srivastava, V.**, A computational model for rate-dependent material state transition response of rate stiffening gels, *17th U.S. National Congress on Computational Mechanics*, Albuquerque, NM, 2023
- Niu, S., Zhang, E., Bazilevs, Y., and **Srivastava, V.**, Computational Data-Based Convolutional and Physics-Based Neural Networks for Structural Mechanics Problems, *17th U.S. National Congress on Computational Mechanics*, Albuquerque, NM, 2023
- Konale, A., Ahmed, Z., and **Srivastava, V.**, A large deformation continuum theory for strong rate-dependent and material phase transition response of shear stiffening gels, *Society of Engineering Science Annual Technical Meeting*, College Station, TX, 2022
- Zong, J., and **Srivastava, V.**, A higher-order morphoelastic beam model for biologically growing tubes and filaments, *19th U. S. National Congress on Theoretical and Applied Mechanics*, Austin, TX, 2022
- Niu, S., and **Srivastava, V.**, FEA trained CNN to accurately characterize a crack and classify interacting flaws from experimental ultrasound measurements, *19th U. S. National Congress on Theoretical and Applied Mechanics*, Austin, TX, 2022
- Ahmed, Z., LoGiudice, K., and **Srivastava, V.**, Hydrogels to regulate extracellular pH in the breast cancer microenvironment and improve chemotherapeutic efficacy, *12th AACR-JCA Joint Conference Breakthroughs in Cancer Research: Translating Knowledge into Practice*, Maui, HI, 2022
- Zhong, J., Lu, A., Bellala, V., LoGiudice, K., and **Srivastava, V.**, Elasto-Viscoplastic-Damage in High Density Polyethylene Under Chemical Environment, *Society of Experimental Mechanics Annual Conference*, Pittsburg, PA, 2022
- Kothari, M., Niu, S., and **Srivastava, V.**, A Thermo-mechanical Continuum Model for Phase-Transitioning Austenitic Steels at Low Temperatures, *ASME International Mechanical Engineering Congress and Exposition*, virtual, 2021
- Usherwood, T., LaJoie, Z., and **Srivastava, V.**, A Population, Behavior, and Vaccination-Based Model for the COVID-19 Pandemic, *ASME International Mechanical Engineering Congress and Exposition*, virtual, 2021
- Sampath, S.G., Lu, A., and **Srivastava, V.**, A Novel Minimally Invasive Nitinol Based Spinal Cord Stimulation Device for Improved Pain Management, *Biomedical Engineering Society Annual Meeting*, virtual, 2021
- LaJoie, Z., Usherwood, T., and **Srivastava, V.**, A Model and Predictions for COVID-19 Considering Population Behavior and Vaccination, *Biomedical Engineering Society Annual Meeting*, virtual, 2021
- Mays, G., Trivedi, S., Ahmed, Z., Logiudice K., and **Srivastava, V.**, A Hydrogel System for pH Regulation of the Tumor Microenvironment, *Biomedical Engineering Society Annual Meeting*, virtual, 2021
- Kothari, M., Niu, S., and **Srivastava, V.**, Thermo-mechanically coupled model for phase transition in austenitic steels for low temperature applications, *25th International Congress of Theoretical and Applied Mechanics*, virtual, 2021
- Niu, S., and **Srivastava, V.**, Accurate NDT Characterization of Hidden Flaws with Mechanics and Machine Learning, *16th U.S. National Congress on Computational Mechanics*, virtual, 2021
- Niu, S. and **Srivastava, V.**, Improved NDT Detection and Probabilistic Failure Prediction for Pipeline Anomalies, *PHMSA Pipeline Safety Research and Development Forum*, Arlington, VA, 2021

Kaiser, N.J., Bai, Y., **Srivastava, V.**, and Coulombe, K.L.K., Precision Collagen Microfiber Architecture for Engineering Tissue Anisotropy, *Regenerative Medicine Workshop*, Charleston, SC, 2020

Kaiser, N.J., Bai, Y., **Srivastava, V.**, and Coulombe, K.L.K., An Integrated Experimental-Computational Approach to Designing Bespoke Collagen Microfiber Architecture in Tissue Scaffolds for Anisotropic Mechanical Performance, *Biomedical Engineering Society Annual Meeting*, Philadelphia, PA, 2019

PATENTS

Shape Memory Alloy and Polymer Electrode Array for Minimally-Invasive Spinal Cord and Brain Stimulation and Recording, **V. Srivastava**, A. Telfeian, and S. Sampath, Patent No. 202190000584.6 (patent in China granted, U.S. in process)

- Finalist in the American Academy of Pain Medicine x MIT Hacking Medicine Innovation Challenge, Miami, FL 2023

pH regulating hydrogels that neutralize tumor acidosis and increase chemotherapy efficacy, **V. Srivastava**, S. Sanatoki, Z. Ahmed, and G. Mays, filed 2022

Computationally Trained Machine Learning Models for Non-Destructive Evaluation of Material and Structural Flaws, **V. Srivastava** and S. Niu, filed 2022

RESEARCH GRANTS

Source of Support: U.S. Department of Transportation

Title: Selection and Development of Safer Polymer and Composite Pipeline Liners through Microstructural and Macroscopic Study of Materials and Designs

Dates: 04/01/2023– 03/30/2026

Role on Grant: PI, **Grant Amount:** \$1,000,000

Source of Support: U.S. Department of Defense, Office of Naval Research

Title: Undersea Vehicle Science and Technologies: Multifunctional Structural Batteries, Materials for Extreme Environments and Multi-Metal Additive Manufacturing

Dates: 06/01/2023 – 05/30/2027

Role on Grant: Co-PI (\$537,600), **Overall Grant Amount:** \$2,762,558,

Lead Investigator for the research project on “Soft tissue and cell damage under impact and shock loads.”

Source of Support: U.S. Department of Defense, Office of Naval Research

Title: Predictive Modeling and Simulation for Next Generation Naval Undersea Vehicles and Platforms

Dates: 06/01/2022 – 05/30/2026

Role on Grant: Co-PI (\$350,000), **Overall Grant Amount:** \$4,684,264

Lead Investigator for the research project “Deformation and damage of FRP and advanced composites.”

Source of Support: U.S. Department of Defense, Office of Naval Research

Title: Undersea Vehicle Science and Technologies: Multifunctional Structural Batteries, Materials for Extreme Environments and Multi-Metal Additive Manufacturing

Dates: 08/01/2022 – 07/31/2026

Role on Grant: Co-PI (\$963,000), **Overall Grant Amount:** \$3,751,412

Lead Investigator for the research area “Materials and Structures for Extreme Environment.”

- *Brown School of Engineering News:* <https://engineering.brown.edu/news/2021-09-27/onr-award>

Award: Brown Biomedical Innovations to Impact

Source of Support: Brown University

Title: Shape Memory Alloy Based Novel Minimally Invasive Neural Stimulation Device for Improved Pain Management

Dates: 10/01/2022 – 09/30/2023

Role on Grant: PI, **Grant Amount:** \$100,000

Brown University News: <https://www.brown.edu/news/2022-11-30/bbii>

Brown School of Engineering News: <https://engineering.brown.edu/news/2022-12-01/bbii-awards-2022>

Source of Support: General Motors

Title: General Motors-Brown University Collaborative Research Laboratory in Computational Materials Research

Dates: 12/01/2021 – 06/30/2024 **(Completed)**

Role on Grant: Co-PI (\$200,000), **Overall Grant Amount:** \$1,250,000

Lead Investigator for the research project “Modeling of Li metal deformation and SEI failure during deposition and stripping for Li-battery anode.”

Source of Support: U.S. Department of Transportation

Title: Modeling Slow Crack Growth Under Thermal and Chemical Effects and Accurate NDT of Cracks for Fitness Predictions of Polyethylene Pipes

Dates: 09/01/2020 – 08/31/2023 **(Completed)**

Role on Grant: PI, **Grant Amount:** \$250,000

Award: Research Seed Award

Source of Support: Brown University

Title: Responsive Hydrogel Based pH Regulation of Cancer Tumor Microenvironment to Reduce Metastasis

Dates: 03/01/2021 – 06/30/2023 **(Completed)**

Role on Grant: PI, **Grant Amount:** \$50,000

News articles: [Brown Herald](#) and [Brown 2021-seed-awardees](#)

Source of Support: Rhode Island State Commerce Corporation, Hitachi

Title: **Understanding** Microstructural Variables and their effects on Thermoplastic Polyurethane Properties

Dates: 10/01/2020 – 07/31/2021 **(Completed)**

Role on Grant: PI, **Grant Amount:** \$50,000

Award: Richard B. Solomon Faculty Research Award to recognize excellence in scholarship

Source of Support: Brown University

Title: Bio-inspired Novel Hydrogel Architecture for Energy Harvesting

Dates: 05/01/2020 – 06/30/2022 **(Completed)**

Role on Grant: PI, **Grant Amount:** \$13,300

Brown School of Engineering News: <https://engineering.brown.edu/news/2020-04-08/university-awards>

Source of Support: U.S. Department of Transportation

Title: Improved NDT Detection and Probabilistic Failure Prediction for Interacting Pipeline Anomalies

Dates: 10/01/2019 – 09/30/2022 **(Completed)**

Role on Grant: PI, **Grant Amount:** \$250,000

Source of Support: Rhode Island State Commerce Corporation, Gliaview LLC

Title: Biopolymers for Cranial Prosthesis Application

Dates: 06/01/2019 – 05/31/2020 **(Completed)**

Role on Grant: PI, **Grant Amount:** \$50,000

TEACHING

Course evaluation scale: *Highest effectiveness = 5 to Lowest effectiveness = 1*

Brown Engineering News: <https://engineering.brown.edu/news/2023-05-02/teaching-mentoring-dei-awards>

Graduate Course:

ENGN 2911R: **Analytical Modeling for Biomechanical and Biomedical Systems** (*new course developed*)

- Fall 2021: 15 students (93% response). Instructor Effectiveness: 4.93; Course Effectiveness: 4.93
- Fall 2020: 22 students (91% response). Instructor Effectiveness: 4.70; Course Effectiveness: 4.68
- Fall 2019: 13 students (100% response). Instructor Effectiveness: 5.00; Course Effectiveness: 5.00
- Fall 2018: 9 students (89% response). Instructor Effectiveness: 5.00; Course Effectiveness: 4.63

Brown School of Engineering News: <https://engineering.brown.edu/news/2020-04-17/conversations-covid>

Undergraduate Course:

ENGN 1210: **Biomechanics** (*upper-level core course*)

- Spring 2024: 33 students (88% response). Instructor Effectiveness: 4.67; Course Effectiveness: 4.56
- Spring 2023: 42 students (86% response). Instructor Effectiveness: 4.79; Course Effectiveness: 4.65
- Spring 2022: 33 students (88% response). Instructor Effectiveness: 4.77; Course Effectiveness: 4.58
- Spring 2021: 26 students (77% response). Instructor Effectiveness: 4.95; Course Effectiveness: 4.74
- Spring 2020: 27 students (96% response). Instructor Effectiveness: 4.88; Course Effectiveness: 4.74
- Spring 2019: 22 students (82% response). Instructor Effectiveness: 4.67; Course Effectiveness: 4.44

Course Instructor at ExxonMobil

- **Fitness for Service of Structures:** Overview and Case Studies 2017
- **Offshore and Arctic Engineering:** Deepwater Field Development 2013 –2014
- **Floating Drilling School:** Drilling Riser and Stationkeeping Systems 2012 – 2014

ADVISING

Postdoctoral fellows advised

Vaishakh Kotilla Veedu, Ph.D. (Solid Mechanics) 2022 – current
Hygroscopic damage and failure of fiber-reinforced composites

Shabnam Konica, Ph.D. (Solid Mechanics) 2022 – 2023
Continuum scale modeling of Li anode surface instabilities
(current position: FEA Developer, Dassault Systems)

Jun Zhong, Ph.D. (Solid Mechanics) 2020 – 2022
Modeling of cell-extracellular matrix interactions, polyethylene damage and failure modeling
(current position: Scientist, Bristol Myers Squibb)

Mrityunjay Kothari, Ph.D. (Solid Mechanics) 2018 – 2019
Thermo-mechanically coupled modeling of metastable austenitic steels
(current position: **tenure-track Assistant Professor** of Mechanical Engineering at the University of New Hampshire)

Doctoral dissertations supervised

Sijun Niu (Solid Mechanics)	2018 – 2022 (Graduated)
<u>Thesis:</u> Finite Element and Neural Networks for Flaw Characterization and Plasticity Models (current position: Display Mechanical Engineer, Apple Inc.)	
Aditya Konale (Solid Mechanics)	2021 – current
Expected Completion: 2026	
Kevin LoGiudice (Biomedical Engineering)	2021 – current
Expected Completion: 2026	
Zahra Ahmed (Biomedical Engineering)	2019 – current
Expected Completion: 2025	
Deepro Ghosh (Solid Mechanics)	2023 – current
Expected Completion: 2028	

Master's thesis supervised

Tarik Simpson (Biomedical Engineering)	2023 – current
Dingyi Yang (Biomedical Engineering)	2022 – current
Dashaun Simon (Biomedical Engineering)	Graduated (2024)
<u>Thesis:</u> An Experimental Study of a Flexible, Self-Healing Strain Sensor	
Hyun Young Nam (Solid Mechanics)	Graduated (2023)
<u>Thesis:</u> A Slow Crack Growth Model for High-Density Polyethylene under Thermal and Chemical Environment (current position: Ph.D. student at Brown University)	
Francesca Abulencia (Biomedical Engineering)	Graduated (2023)
<u>Thesis:</u> A Method for the Detection and Characterization of Breast Tumors using Ultrasound with CNN (current position: Clinical Informatics Analyst, InterSystems)	
Andrea Lu (Biomedical Engineering)	Graduated (2022)
<u>Thesis:</u> Response and Failure Behavior of HDPE and UHMWPE under Chemical, Biological, and Thermal Environments (current position: Associate Marketing Manager, BD Medical Device Company)	
Anna Rusnak (Biomedical Engineering)	Graduated (2022)
<u>Thesis:</u> Using Convolutional Neural Network for Early Breast Cancer Detection (current position: Research Associate, Computational Biology/AI at FL84)	
Gavin May (Biomedical Engineering)	Graduated (2022)
<u>Thesis:</u> Effect of pH-Regulation on Chemotherapeutic Efficacy (current position: Ph.D. student at Yale University)	
Kevin LoGiudice (Biomedical Engineering)	Graduated (2021)
<u>Thesis:</u> Responsive Hydrogel-Based pH Regulation to Reduce Malignant Phenotypes in Breast Cancer Cells (current position: Ph.D. student at Brown University)	
Shruti Trivedi (Chemical Engineering)	Graduated (2021)
<u>Thesis:</u> Development of Hydrogel Systems for pH Regulation of Cancer Tumor Microenvironment (current position: Senior Associate Scientist at Pfizer Pharmaceutical R&D)	
Shailen Sampath (Biomedical Engineering)	Graduated (2021)
<u>Thesis:</u> Shape Memory Nitinol Based Minimally Invasive Spinal Cord Stimulation Lead Concept for Pain Relief (current position: Medical student at Columbia University)	

Yifei Bai (Solid Mechanics)	Graduated (2020)
<u>Thesis:</u> Computational modeling of anisotropic engineered heart tissue (current position: Ph.D. student at the University of Oxford)	
Savan Santoki (Fluid Mechanics)	Graduated (2020)
<u>Thesis:</u> A biocompatible hydrogel system for active pH control (current position: Founder Advanced Magnetic Products)	
Luis Marquez (Fluid Mechanics)	Graduated (2020)
<u>Thesis:</u> Design and analysis of a new minimally invasive spinal cord stimulation device (current position: Mechanical Engineer at Veranex)	

Undergraduate honors research thesis supervised

Angelina Schorr	2024
<u>Thesis:</u> Cancer Cell Response to Chemical Stimuli in Engineered Tumor Microenvironments	
Rachel Rowey	2024
<u>Thesis:</u> Immune Checkpoint Inhibitor Releasing and pH-Modulating Hydrogels for Acidosis-Dependent Immunosuppression	
Karolina Palac	2024
<u>Thesis:</u> Mechanical Considerations for In Vitro Studies of Cell Behavior	
Venkatsai Bellala	2024
<u>Thesis:</u> Development of a Drop Tower to Experimentally Study Moderate Rate Cell Injury	
Ishitaa Gupta	2024
<u>Thesis:</u> Inducing polymer mesophases and analyzing their properties in non-mesogenic polymers	
Ruth Sullivan	2023
<u>Thesis:</u> Experimental Validation of FEA Trained Neural Network for Characterization of Soft Tissue Anomalies	
Zachary LaJoie	2022
<u>Thesis:</u> A mathematical model for COVID-19 considering population behavior, variants, and vaccination	
Shailen Sampath	2020
<u>Thesis:</u> Design of Minimally Invasive Percutaneous Spinal Cord Stimulation Leads using Shape Memory Polymer and Super Elastic Alloy	

Ph.D. thesis committees served

Deanna Stueber (Biomedical Engineering) (Thesis Advisor: Vicki Colvin, Ph.D.)	Graduated (2024)
Weican Li (Solid Mechanics) (Thesis Advisor: Yuri Bazilevs, Ph.D.)	Graduated (2024)
Josephine Kalshoven (Biomedical Engineering) (Thesis Advisor: Joseph Crisco, Ph.D.)	Graduated (2024)
Cu Huy (Biomedical Engineering) (Thesis Advisor: Arto Nurmikko, Ph.D.)	Graduated (2024)
Ramisa Fariha (Biomedical Engineering) (Thesis Advisor: Anubhav Tripathi, Ph.D.)	Graduated (2024)
Enrui Zhang (Applied Mathematics) (Thesis Advisor: George Karniadakis, Ph.D.)	Graduated (2023)
Ryan Dubay (Biomedical Engineering) (Thesis Advisor: Eric Darling, Ph.D.)	Graduated (2023)

Alicia Minor (Biomedical Engineering) (Thesis Advisor: Kareen Coulombe, Ph.D.)	Graduated (2023)
Wenqiang Fang (Solid Mechanics) (Thesis Advisor: Haneesh Kesari, Ph.D.)	Graduated (2022)
Cameron Baptista (Biomedical Engineering) (Thesis Advisor: Edith Mathiowitz, Ph.D.)	Graduated (2022)
Xiuqi Li (Solid Mechanics) (Thesis Advisor: David Henann, Ph.D.)	Graduated (2021)
Yixiang Deng (Fluids and Thermal Sciences) (Thesis Advisor: George Karniadakis, Ph.D.)	Graduated (2021)
Weilin Deng (Solid Mechanics) (Thesis Advisor: Haneesh Kesari, Ph.D.)	Graduated (2019)
Kaushik Vijaykumar (Solid Mechanics) (Thesis Advisor: Haneesh Kesari, Ph.D.)	Graduated (2019)
Michael Jandron (Solid Mechanics) (Thesis Advisor: David Henann, Ph.D.)	Graduated (2019)
Mitchell Harling (Biomedical Engineering) (Thesis Advisor: Kimani Toussaint, Ph.D.)	2022 – current
Alex Hruska (Biomedical Engineering) (Thesis Advisor: Ian Wong, Ph.D.)	2023 – current
Krishangi Krishna (Biomedical Engineering) (Thesis Advisor: Kimani Toussaint, Ph.D.)	2022 – current
Kiera Dwyer (Biomedical Engineering) (Thesis Advisor: Kareen Coulombe, Ph.D.)	2021 – current
Lily Cordner (Biomedical Engineering) (Thesis Advisor: Ian Wong, Ph.D.)	2024 – current
Nazanin Ahmadi (Biomedical Engineering) (Thesis Advisor: George Karniadakis, Ph.D.)	2024 – current

Master's thesis committees served

Samantha Zalk (Biomedical Engineering, Thesis Advisor: Jillian Beveridge, Ph.D.)	2024
Achilles Gatsonis (Biomedical Engineering, Thesis Advisor: George Karniadakis, Ph.D.)	2024
Alejandro Marzoratti (Biomedical Engineering, Thesis Advisor: Ian Wang, Ph.D.)	2023
Madison Altieri (Biomedical Engineering, Thesis Advisor: Joseph Crisco, M.D.)	2023
Braxton Morrison (Biomedical Engineering, Thesis Advisor: Michelle Dawson, Ph.D.)	2023
Dana Leichter (Biomedical Engineering, Thesis Advisor: Richard Gilbert, M.D.)	2022
Anyaa Shah (Biotech, Thesis Advisor: Edith Mathiowitz, Ph.D.)	2022
Itzel Aponte (Biomedical Engineering, Thesis Advisor: Vicki Colvin, Ph.D.)	2021
Tobias Clevinger (Biomedical Engineering, Thesis Advisor: Edith Mathiowitz, Ph.D.)	2021
Julian Montagut (Biomedical Engineering, Thesis Advisor: Jonghwan Lee, Ph.D.)	2020
Sheila Velagapudi (Biomedical Engineering, Thesis Advisor: Edith Mathiowitz, Ph.D.)	2020
Gina Vimbela (Biomedical Engineering, Thesis Advisor: Anubhav Tripathi, Ph.D.)	2019
Travis Nguyen (Biotechnology, Thesis Advisor: Edith Mathiowitz, Ph.D.)	2019

Undergraduate researchers advised

Mia Kamisato**, Class of 2026	2024 – current
Manu Chigzoie**, Class of 2026	2024 – current
Joseph Olagundoye**, Class of 2026	2024 – current
Emilio Peveri, Class of 2026	2024 – current
Xinai Zhang, Biomedical Engineering, Class of 2026	2024 – current
Hellie Chen, Class of 2027	2024 – current
Stella Chen**, Mechanical Engineering, Class of 2026	2023 – current
Serly Chohmalian**, Biomedical Engineering, Class of 2026	2023 – current
Eshanika Urs, Biomedical Engineering, Class of 2026	2023 – current
Daanish Qureshi, Biomedical Engineering, Class of 2025	2022 – current
Rachel Rowey^^^**,**, Biomedical Engineering, Class of 2024	2022 – 2024
Karolina Palac**,**, Biomedical Engineering, Class of 2024	2022 – 2024
Angelina Schorr^^**,**^x, Biomedical Engineering, Class of 2024	2021 – 2024
Venkatsai Bellala**,**, Biomedical Engineering, Class of 2024	2020 – 2024
Ruth Sullivan**, Biomedical Engineering, Class of 2023	2020 – 2023
Thomas Usherwood+^^x, Biomedical Engineering, Class of 2022	2020 – 2022
Zachary LaJoie**,**^^, Biomedical Engineering, Class of 2022	2020 – 2022
Haisong Yang, Biomedical Engineering, Class of 2022	2021 – 2022
Nicolas Ortega, Biomedical Engineering, Class of 2022	2021 – 2022
Shailen Sampath**, Biomedical Engineering, Class of 2020	2019 – 2020
Roberto Castro**, Chemical Engineering, Class of 2022	2019 – 2021
William Back**, Engineering Physics, Class of 2022	2020 – 2021
Isaac Nathoo**, Biomedical Engineering, Class of 2021	2018 – 2020
Amy Oh, Biomedical Engineering, Class of 2022	2018 – 2021
Norbesida Bagabila**, Biomedical Engineering, Class of 2021	2019
Capstone project advisor for Sarah Berman, Meredie Cohen, and Mariko Kishimoto.	2020

*Barry Goldwater Scholarship, ^Outstanding BME Senior Award, ^xNSF GRF, ^^cOncurrent Sc.M. in Electrical/Computer Engineering with an ScB in Biomedical Engineering, ^^The Neal Mitchell '58 Systems Thinking Project Award, ^^Doris M. and Norman T. Halpin Prize, **UTRA Undergraduate Research Award, ***Honors Thesis Advisee

OUTREACH AND SERVICE

To the university

Director of Graduate Studies in the <i>Institute of Biology, Engineering, and Medicine</i>	2024 – present
Biomedical Engineering Concentration Advisor	2022 – 2024
Biomedical Engineering Graduate Program Committee Member	2021 – 2022

Freshman and Sophomore Advisor	2019 – present
Hibbitt and Hope St Postdoc Fellows Committee	2023 – present
Biomedical Engineering Industry Liaison	2019 – present
Honors Thesis Program Committee, School of Engineering	2018 – present
Critical Challenge Project Advisor, Executive Masters in Science & Technology Leadership	2018 – present

To the profession

Reviewer for peer-reviewed journals: Acta Biomaterialia, Journal of the Mechanics and Physics of Solids, Mechanics of Materials, International Journal of Plasticity, Journal of Applied Mechanics, Soft Matter, Engineering with Computers, Extreme Mechanics Letters, Composites Part B, Experimental Mechanics, International Journal of Impact Engineering, Carbohydrate Polymers, Cellular and Molecular Bioengineering, Cold Regions Science and Technology, Materials Today Communications

Panel: U.S. Department of Transportation PHMSA Core R&D Program 2020

Panel: National Science Foundation, Division of Civil, Mechanical and Manufacturing Innovation 2019

Advisory Board Member, High-Pressure High-Temperature Subsea Systems 2017 – 2018

DeepStar Global Offshore Technology Development Consortium (Represented ExxonMobil on a board including leaders from other oil and gas majors, Chevron, Equinor, Occidental, and Shell)

Member of the Ph.D. Board of Examiners for the Indian Institute of Technology, Delhi 2023 – present

Conference symposium co-chair: Society of Experimental Mechanics (2023), Society of Engineering Science (2023)

To the community

Faculty advisor to South Asian scholars in STEM (SASS) for student professional development 2023 – present

STEM Outreach: Lectures to *Lincoln School* (all girls K-12) on mechanics of materials 2019, 2020, 2021

Invited lecture titled “*Artic, Energy and Environment*” 2019

for the Brown course titled Social Impact of Emerging Technologies – The Role of Scientists/Engineers

Invited speaker, Brown Biomedical Engineering and Biotechnology Ph.D. program annual retreat 2019

Panelist “Transition from postdoc to faculty,” Brown postdoctoral retreat 2019

Panelist “Getting into the industry as a Ph.D. scientist/engineer,” 2019

Brown Biomedical Engineering and Biotechnology Ph.D. program annual retreat

Panelist “Industry perspective,” Brown Biomedical Engineering Society 2019

ExxonMobil’s Campus Ambassador to M.I.T. 2014 – 2017

AFFILIATIONS

American Society of Mechanical Engineers, Society of Engineering Science, Society of Experimental Mechanics, Biomedical Engineering Society