Austin R.J. Downey

Curriculum Vitae

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Professional Academic Experience

June 2024 - present **CEC Distinguished Associate Professorship**, Department of Mechanical Engineering, University of South Carolina, Columbia, South Carolina.

August 2023 - present **Associate Professor**, Department of Mechanical Engineering with dual appointment in Department of Civil and Environmental Engineering, University of South Carolina, Columbia, South Carolina.

August 2024 - December 2024 **Fulbright Scholar Fellow** Sweden Fulbright Commission, Stockholm, Sweden.

August 2024 - December 2024 **Visiting Associate Professor**, Department of Mechanics and Maritime Sciences, Department of Electrical Engineering, Chalmers University of Science and Technology, Gothenburg, Sweden.

August 2018 - July 2023 **Assistant Professor**, Department of Mechanical Engineering with dual appointment in Department of Civil and Environmental Engineering, University of South Carolina, Columbia, South Carolina.

June - July 2022 **Summer Faculty Fellow**, Air Force Research Laboratory, United States Air Force, Eglin Air Force Base, Valparaiso, Florida.

June - August 2020 **Visiting Faculty**, Naval Surface Warfare Center, United States Navy, Carderock, Potomac Maryland.

May - July 2019 **Summer Faculty Fellow**, Air Force Research Laboratory, United States Air Force, Eglin Air Force Base, Valparaiso, Florida.

August 2014 - July 2018 **Graduate Research Assistant**, major advisors: Chao Hu and Simon Laflamme Departments of Mechanical Engineering and Civil, Construction & Environmental Engineering, Iowa State University, Ames, Iowa.

May 2013 - May 2014 **Undergraduate Research Assistant**, major advisor: Simon Laflamme Department of Civil, Construction & Environmental Engineering, Iowa State University, Ames, Iowa.

Education

2014 - 2018 **Ph.D.**, from the Departments of Mechanical and Aerospace Engineering with Dual Majors in Wind Energy Science, Engineering, & Policy and Engineering Mechanics, Iowa State University, Ames, Iowa. Dissertation: "Sensing skin for the structural health monitoring of mesoscale structures".

2012 - 2014 **B.S.**, Civil Engineering, Iowa State University, Ames, Iowa.

2009 - 2012 **A.S.**, Pre-Engineering Program, Des Moines Area Community College.

2006 - 2007 **T.C.**, Industrial Mechanics, Iowa Central Community College, Fort Dodge, Iowa.

Curriculum Vitae Statistics

Publications	Over 2,300 citations, h-index 25, i10-index 42, over 175 publications.
Students	11 current Ph.D and 2 current M.S; 3 graduated Ph.D. 11 graduated M.S.
Students	Actively mentored over 100 Undergraduate students in significant research actives.
Funding	Over $45M in total funding ($4.99M my portion) with $2.7M as project PI.
Funding	Over $109,000 in undergraduate led research (serving as faculty advisor) across 55 awards.

Non-Academic Experience

2015 - 2021	**President**, Infrastructure and Environmental Systems Support (IESS), Ankeny, Iowa.
2014	**Field Engineer**, Kotzebue Electric Association, Kotzebue, Alaska.

Awards and Honors

[23] **Gary Anderson Early Achievement Award** The American Society of Mechanical Engineers - ASME, For notable contributions to the field of Adaptive Structures and Material Systems, 2025.

[22] **Samuel Litman Distinguished Professor Award** University of South Carolina, Molinaroli College of Engineering and Computing, Recognizing the contributions of the educational process other than research, 2025.

[21] **Best Student Paper** at the Dam Safety 2024 Conference hosted by the Association of State Dam Safety Officials for the paper "Assessment of Levees Using Field Instrumentation and Geophysical Methods", 2024.

[20] **South Carolina Governor's Young Scientist Award for Excellence in Scientific Research (YESR)** from the South Carolina Academy of Science and the Office of the Governor, 2024.

[19] **Fulbright Fellowship - Sweden** US Scholars Research Fellowship at Chalmers University of Technology for the Fall 2024 school year.

[18] **Showcase Paper** for the American Institute of the Aeronautics and Astronautics (AIAA) SciTech 2024 Paper "Extending Battery Life via Load Sharing in Electric Aircraft".

[17] **Highly Cited Paper**, #1 in Applied Science's Robotics and Automation section (MDPI) for the 2021 paper "Drone-Based Vibration Monitoring and Assessment of Structures", 2023.

[16] **NSF-CAREER** for the project "Data-Driven Control of High-Rate Dynamic Systems", National Science Foundation, 2023.

[15] **College of Engineering and Computing Young Investigator Research Award**, University of South Carolina, 2022.

[14] **Best Student Paper Award**, "Measurement of Magnetic Particle Concentrations in Wildfire Ash via Compact NMR" IEEE Sensors Conference, 2022.

[13] **NAE EU-US Frontiers of Engineering Symposium Invited Participant**, Invited by the National Academy of Engineering (NAE) to participate in the 2022 EU-US Frontiers of Engineering Symposium (EU-US FOE) in Bled, Slovenia Oct 2022. One of 60 early-career engineers from EU and US.

[12] **AFOSR-YIP** for the project "Real-time Model Updating for Structures in Shock Environments", Air Force Office of Scientific Research 2021.

[11] **Outstanding Reviewer of 2019**, Smart Materials and Structures, IOP Publishing 2020.

[10] **SCoer Faculty Award**, University of South Carolina, University Libraries 2019.

[9] **Comet Hall of Fame**, Charles City Community School District 2019.

[8] **Research Excellence Award**, Department of Mechanical Engineering, Iowa State University 2018.

[7] **Best Paper Award**, 4th International Electronic Conference on Sensors and Applications (ECSA-4) 2017.

[6] **Graduate Research** Award Department of Mechanical Engineering, Iowa State University 2017.

[5] **Featured Article**, "Biphasic DC Measurement Approach for Enhanced Measurement Stability and Multi-channel Sampling of Self-sensing Multi-functional Structural Materials Doped with Carbon-based Additives", Smart Materials and Structures 2016.

[4] **2016 Journal Highlights**, "Reconstruction of In-plane Strain Maps Using Hybrid Dense Sensor Network Composed of Sensing Skin", Measurement Science and Technology 2016.

[3] **2015 Journal Highlights**, "Network of Flexible Capacitive Strain Gauges for the Reconstruction of Surface Strain", Measurement Science and Technology 2015.

[2] **National Science Foundation - IGERT Fellowship**, Iowa State University, Wind Energy Science, Engineering and Policy 2014.

[1] **Pak-Liu Fung Undergraduate Research Scholarship**, Department of Civil Construction and Environmental Engineering, Iowa State University awarded twice, August 2013 and January 2014.

Research Experience

High-Rate Machine Learning This research area combines advanced structural modeling with high-rate machine learning, focusing on real-time decision making for dynamic environments. Key contributions include the development of computational models for complex structural analysis and high-speed machine learning algorithms for rapid data processing and anomaly detection in high-stress scenarios.

Smart Infrastructure Systems This research area focuses on the advancement of smart infrastructure systems through the integration of UAV-deployed sensors. Significant contributions include the development and application of UAV-deployed sensing technologies for enhanced structural health monitoring and infrastructure assessment to improving the resilience and performance of civil infrastructure.

Smart Materials and Innovative Sensing The research in this field involves the development of smart materials and innovative sensing technologies for enhanced structural health monitoring. Key contributions include the creation of large area capacitive sensors, soft elastomeric capacitors, and nanocomposite sensors for damage detection in diverse structures such as wind turbines, concrete infrastructures, and composite materials. This work also demonstrates the effective integration of advanced sensors with conventional construction materials.

Battery Systems This research focuses on advancing battery technology and energy systems, incorporating machine learning algorithms for battery performance optimization and safety. Significant contributions include developing methods for analyzing battery behaviors, optimizing electro-mechanical powertrain systems, and creating battery emulators for powertrain testing.

In Situ Manufacturing Monitoring The research in this area emphasizes the development of in situ monitoring techniques in additive manufacturing, focusing on real-time quality validation of components during the manufacturing process. Key contributions include innovations in monitoring methodologies for processes like fused filament fabrication and metal laser-based additive manufacturing.

Visiting Scholarship

August 2024 - December 2024 **Chalmers University of Science and Technology**, Developed tools for edge computing and signal processing on UAVs in addition to developing intelligent battery management systems.

June - July 2022 **Air Force Research Laboratory (AFRL) Munitions Directorate**, Developed tools for real-time model updating for structures operating in shock environments.

May - July 2020 **Naval Surface Warfare Center (NSWC) Carderock**, Investigated multi-timescale model updating for ship structures subjected to fatigue and impact.

May - July 2019 **Air Force Research Laboratory (AFRL) Munitions Directorate**, Developed algorithms and methodologies for microsecond model updating for structures operating in ballistic environments.

June 2018 **Air Force Research Laboratory (AFRL) Munitions Directorate**, Investigated the implementation of real-time modeling techniques for the state-estimation of structures experience high-rate dynamics.

June - Aug. 2017 **University of Perugia**, Collaborated on the development and modeling of a clay brick doped with nanoparticles to form a new class of embedded sensors for structural health monitoring, fully funded by the Italian Ministry of Education, University and Research (MIUR).

July - Dec. 2016 **University of Perugia**, Collaborated on the development of data-driven algorithms for damage detection in wind turbine blades, and model-based approaches for damage detection in conductive concrete, fully funded by the NSF through IGERT.

May 2015 **University of Perugia**, Developed testing procedures and protocols for a new class of nanocomposite cement-based sensors for structural health monitoring.

Grants and Contracts

[28] **National Aeronautics and Space Administration**, "Event Camera paired with Time-series AI to Enable In-Space Melt Pool Monitoring for Metal-based Additive Manufacturing", April 2025 - April 2026, $20,000 PI: Austin Downey, Lang Yuan, and Yanzhou Fu.

[27] **Office of Naval Research**, "An Antifragile Future for Naval Installations and Coastal Host Communities", August 2024 - July 2029, $1,624,997 PI: Jasim Imran; Co-PI Austin Downey, Erfan Goharan, Etienne Toussaint, Laura Micheli, SP: Dwayne Porter

[26] **National Aeronautics and Space Administration**, "Artificial Intelligence for Anomaly Detection in Laser Powder Bed Fusion Additive Manufacturing", May 2024 - May 2025, $35,000 PI: Austin Downey, Yanzhou Fu, Lang Yuan, and Gurcan Comert.

[25] **Office of Naval Research**, "Advanced Controls and Decision Aids Based on Digital Twins for Power and Energy Systems", January 2024 - December 2026, $9,995,488 PI: Enrico Santi, SP: Kristen Booth, Roger Dougal, Herbert Ginn, David Matolak, Adel Nasiri, Bin Zhang, Austin Downey, and Jason Bakos.

[24] **National Science Foundation**, "NSF Convergence Accelerator Track K: COMPASS: Comprehensive Prediction, Assessment, and Equitable Solutions for Storm-Induced Contamination of Freshwater Systems", January 2024 - December 2024, $650,000 PI: Jasim Imran; Co-PIs Austin Downey, Mohammed Baalousha, Etienne Toussaint, Mohammad Sadik Khan.

[23] **National Institute of Standards and Technology**, "Real-time In Situ Microstructure Characterization by Ultrasound in Additive Manufacturing", May 2023 - May 2025, $957,290 PI: Lang Yuan; Co-PI Austin Downey.

[22] **National Science Foundation**, "Collaborative Research: SHF: Small: Sub-millisecond Topological Feature Extractor for High-Rate Machine Learning", May 2023 - May 2025, $250,000 PI: Austin Downey; Co-PI Jason Bakos.

[21] **National Science Foundation**, "CAREER: Data-Driven Control of High-Rate Dynamic Systems", February 2023 - January 2028, $551,876 PI: Austin Downey.

[20] **Office of Naval Research**, "Phase III - Digital Twins for Resilient Power and Energy Systems", January 2023 - January 2026, $10,000,000 PI: Roger Dougal; SP: Austin Downey, Dr. Jamil Khan, Adel Nasiri, Herbert Ginn III, Enrico Santi, and Kristen Booth.

[19] **Office of Naval Research**, "Naval P&E Testbed Components", November 2022 - November 2023, $650,000 PI: Roger Dougal; Co-PIs: Austin Downey, Kristen Booth, and Enrico Santi.

[18] **National Aeronautics and Space Administration**, "Enhanced Electro-mechanical Powertrain Safety through Deterministic Online Model Assimilation", August 2022 - July 2023, $100,000 PI: Kristen Booth; Co-PIs: Austin Downey and Jason Bakos.

[17] **National Science Foundation**, "LEAP-Hi: A data-driven Fragility Framework for Risk Assessment of Levee Breach", August 2022 - July 2027, $2,000,000 PI: Jasim Imran; Co-PIs: Austin Downey, Laura Micheli, Mohammad Sadik Khan, and Jason Bakos.

[16] **National Aeronautics and Space Administration**, "In-situ Real-time Defect Detection in Metal-based Additive Manufacturing", April 2022 - April 2023, $20,000 PI: Lang Yuan; Co-PI Austin Downey.

[15] **Office of Naval Research**, "Digital Twin Technology for Navy P&E Systems", December 2021 - December 2024, $9,999,605, PI: Roger Dougal; Co-PIs: Herbert Ginn, Enrico Santi, Jamil Khan, and Austin Downey.

[14] **Department of the Army - Materiel Command**, "Chemical Functional Group Approach for Low-Temperature Oxidation of Liquid Fuels", July 2021 - December 2023, $1,000,000 PI: Sang Hee Won; Co-PIs Tanvir Farouk, Austin Downey.

[13] **University of South Carolina**, "ASPIRE II: A Rapid Response System for the Assessment and Prediction of Contaminant Dispersion in Wet-Weather Emergencies", July 2021 - December 2022, $100,000 PI: Jasim Imran; Co-PIs Austin Downey, Nikolaos Vitzilaios, Mohammed Baalousha, Erfan Goharian.

[12] **Air Force Office of Scientific Research**, "2021 YIP: Real-time Model Updating for Structures in Shock Environments", May 2021 - May 2024, $450,000 PI: Austin Downey.

[11] **National Aeronautics and Space Administration**, "Mini-REAP 2020: Towards Real-time Online Validation of Additively Manufactured Metallic Components", October 2020 - April 2021, $9,979 PI: Lang Yuan; Co-PI Austin Downey.

[10] **National Science Foundation**, "Collaborative Research:SHF:Medium:Machine Learning on the Edge for Real-Time Microsecond State Estimation of High-Rate Dynamic Events", August 2020 - July 2024, $706,248, PI: Jason Bakos; Co-PI: Austin Downey.

[9] **Office of Naval Research**, "Talent and Technology for Navy Power and Energy Systems", February 2020 - February 2021, $4,585,426, PI: Roger Dougal; Co-PIs: Herbert Ginn, Enrico Santi, Jamil Khan, and Austin Downey.

[8] **United States Department of Transportation**, "Robust wireless skin sensor networks for long-term fatigue crack monitoring of bridges", May 2020 - May 2023, $80,000, PI: Austin Downey; Co-PI: Paul Ziehl.

[7] **Air Force Office of Scientific Research**, "DURIP: Real-Time Edge Computing in Structures Experiencing Shock", February 2020 - February 2021, $201,882, PI: Austin Downey; Co-PIs: Paul Ziehl, Sourav Banerjee, Lingyu Yu, and Jason Bakos.

[6] **National Science Foundation**, "RTML: Small: Collaborative: A Programming Model and Platform Architecture for Real-time Machine Learning for Sub-second Systems", May 2019 - May 2022, $291,785, PI and Project Lead: Austin Downey; Co-PI: Jason Bakos.

[5] **University of South Carolina**, "SCoer Development of Open Educational Resources for a No-cost Mechanical Vibrations Class (EMCH 330) at the University of South Carolina", August 2019 - December 2019, $500, PI: Austin Downey.

[4] **Air Force Research Laboratory**, "Subcontract on Prime Contract No FA8651-16-D-0311, Task Order 0004. Real Time High-rate Decision Making for Functional Prognosis of Complex Mechanical Systems", April 2019 - March 2021, $39,999, PI: Austin Downey.

[3] **South Carolina Research Authority**, "Smart Additive Manufacturing Enabled by In-situ Sensing and Hybrid Computational Models", July 2019 - June 2020, $99,836, PI: Lang Yuan; Co-PI: Austin Downey.

[2] **University of South Carolina**, "ASPIRE-I: Real-Time Surrogate Model Updating for Structures Experiencing High-Rate Dynamics", August 2019 - July 2021, $15,000, PI: Austin Downey; Co-PI: Yi Wang.

[1] **National Science Foundation**, "CRII: Algorithms and Methodologies for Real-Time Decision-Making of Mission-Critical Structures Experiencing High-Rate Dynamics", March 2019 - February 2021, $191,000, PI: Austin Downey.

Journal Articles

[65] Faisal Nissar Malik, Liang Cao, James Ricles, and Austin Downey. Online cyber-physical neural network model for real-time hybrid simulation. *Earthquake Engineering and Structural Dynamics*, August 2025. doi:10.1002/eqe.70036

[64] Ege Can Kurter, Mohammad Sadik Khan, Laura Micheli, Austin R.J. Downey, and Jasim Imran. Fragility curves for highway embankment slope stability under extreme rainfall. *Natural Hazards Review*, 26(4), November 2025. doi:10.1061/nhrefo.nheng-2248

[63] Winford Janvrin, Jacob Martin, Daniel Hancock, Angelo Varillas, Austin R.J. Downey, Perry J. Pellechia, Joud Satme, and Sang Hee Won. Open-source compact time-domain hydrogen (1H) NMR system for field deployment. *HardwareX*, 22:e00651, June 2025. doi:10.1016/j.ohx.2025.e00651

[62] Kerry Sado, Jarrett Peskar, Austin Downey, Jamil Khan, and Kristen Booth. A digital twin based forecasting framework for power flow management in DC microgrids. *Scientific Reports*, 15(1), February 2025. doi:10.1038/s41598-025-91074-0

[61] Yang Kang Chua, Daniel Coble, Arman Razmarashooli, Steve Paul, Daniel A. Salazar Martinez, Chao Hu, Austin R.J. Downey, and Simon Laflamme. Probabilistic machine learning pipeline using topological descriptors for real-time state estimation of high-rate dynamic systems. *Mechanical Systems and Signal Processing*, 227:112319, March 2025. doi:10.1016/j.ymssp.2025.112319

[60] Yanzhou Fu, Austin R.J. Downey, Lang Yuan, Hung-Tien Huang, and Emmanuel A. Ogunniyi. Simulation-in-the-loop additive manufacturing for real-time structural validation and digital twin development. *Additive Manufacturing*, 98:104631, January 2025. doi:10.1016/j.addma.2024.104631

[59] Arman Razmarashooli, Yang Kang Chua, Vahid Barzegar, Daniel Salazar, Simon Laflamme, Chao Hu, Austin R.J. Downey, Jacob Dodson, and Paul T. Schrader. Real-time state estimation of nonstationary systems through dominant fundamental frequency using topological data analysis features. *Mechanical Systems and Signal Processing*, 224:112048, January 2025. doi:10.1016/j.ymssp.2024.112048

[58] Parker Huggins, Jacob S. Martin, Austin R.J. Downey, and Sang Hee Won. Interpretable machine learning for predicting the derived cetane number of jet fuels using compact TD-NMR. *Sensors and Actuators B: Chemical*, 426:137018, March 2025. doi:10.1016/j.snb.2024.137018

[57] Emmanuel Ogunniyi, Han Liu, Austin Downey, Simon Laflamme, Jian Li, Caroline R Bennett, William Collins, Hongki Jo, and Paul Ziehl. In situ assembly enabling adhesive-free bonding of large area electronic sensors to concrete for structural health monitoring. *Smart Materials and Structures*, September 2024. doi:10.1088/1361-665x/ad7d56

[56] Han Liu, Simon Laflamme, Jian Li, Austin Downey, Caroline Bennett, William Collins, Paul Ziehl, Hongki Jo, and Michael Todsen. Sensing skin technology for fatigue crack monitoring of steel bridges: Laboratory development, field validation, and future directions. *International Journal of Bridge Engineering, Management and Research*, 1(1), September 2024. doi:10.70465/ber.v1i1.8

[55] Seyed Mohammad Hassan Erfani, Mahdi Erfani, Sagy Cohen, Austin R.J. Downey, and Erfan Goharian. A large dataset of fluvial hydraulic and geometry attributes derived from usgs field measurement records. *Environmental Modelling and Software*, page 106136, July 2024. doi:10.1016/j.envsoft.2024.106136

[54] Kerry Sado, Jarrett Peskar, Austin R.J. Downey, Herbert L. Ginn, Roger Dougal, and Kristen Booth. Query-and-response digital twin framework using a multi-domain, multi-function image folio. *IEEE Transactions on Transportation Electrification*, pages 1–1, 2024. doi:10.1109/tte.2024.3425276

[53] Ahad Hasan Tanim, Corinne Smith-Lewis, Austin R.J. Downey, Jasim Imran, and Erfan Goharian. Bayes_Opt-SWMM: A Gaussian process-based Bayesian optimization tool for real-time flood modeling with SWMM. *Environmental Modelling & Software*, page 106122, June 2024. doi:10.1016/j.envsoft.2024.106122

[52] Daniel Coble, Liang Cao, Austin R.J. Downey, and James M. Ricles. Physics-informed machine learning for dry friction and backlash modeling in structural control systems. *Mechanical Systems and Signal Processing*, 218:111522, 2024. doi:10.1016/j.ymssp.2024.111522

[51] Audrey J. Wang, Jianyu Deng, David Westbury, Austin R. J. Downey, Yi Wang, and Guiren Wang. Travel time after photobleaching velocimetry. *Experiments in Fluids*, 65(5), April 2024. doi:10.1007/s00348-024-03806-z

[50] Alexander Brennan Vereen, Austin Downey, Subramani Sockalingam, and Simon Laflamme. Validation of large area capacitive sensors for impact damage assessment. *Measurement Science and Technology*, November 2023. doi:10.1088/1361-6501/ad0954

[49] Seyed Mohammad Hassan Erfani, Corinne Smith, Zhenyao Wu, Elyas Asadi Shamsabadi, Farboud Khatami, Austin R. J. Downey, Jasim Imran, and Erfan Goharian. Eye of horus: a vision-based framework for real-time water level measurement. *Hydrology and Earth System Sciences*, 27(22):4135–4149, November 2023. doi:10.5194/hess-27-4135-2023

[48] Zhymir Thompson, Austin R.J. Downey, Jason D. Bakos, Jie Wei, and Jacob Dodson. Multi-modal generative adversarial networks for synthesizing time-series structural impact responses. *Mechanical Systems and Signal Processing*, 204:110725, December 2023. doi:10.1016/j.ymssp.2023.110725

[47] Jacob S. Martin, Austin R.J. Downey, Mohammed Baalousha, and Sang Hee Won. Rapid measurement of magnetic particle concentrations in wildland-urban interface fire ashes and runoff using compact NMR. *IEEE Sensors Journal*, pages 1–1, 2023. doi:10.1109/jsen.2023.3272882

[46] Emmanuel A. Ogunniyi, Claire Drnek, Seong Hyeon Hong, Austin R.J. Downey, Yi Wang, Jason D. Bakos, Peter Avitabile, and Jacob Dodson. Real-time structural model updating using local eigenvalue modification procedure for applications in high-rate dynamic events. *Mechanical Systems and Signal Processing*, 195:110318, jul 2023. doi:10.1016/j.ymssp.2023.110318

[45] Han Liu, Simon Laflamme, Sdiq Anwar Taher, Jong-Hyun Jeong, Jian Li, Caroline Bennett, William N Collins, David J Eisenmann, Austin Downey, Paul Ziehl, and Hongki Jo. Investigation of soft elastomeric capacitor for the monitoring of large angular motions. *Materials Evaluation*, 81(2):46–51, feb 2023. doi:10.32548/2023.me-04294

[44] Emmanuel Ogunniyi, Alexander Vereen, Austin R.J. Downey, Simon Laflamme, Jian Li, Caroline R Bennett, William Collins, Hongki Jo, Alexander Henderson, and Paul Ziehl. Investigation of electrically isolated capacitive sensing skins on concrete to reduce structure/sensor capacitive coupling. *Measurement Science and Technology*, feb 2023. doi:10.1088/1361-6501/acbb97

[43] Yanzhou Fu, Austin R.J. Downey, Lang Yuan, and Hung-Tien Huang. Real-time structural validation for material extrusion additive manufacturing. *Additive Manufacturing*, page 103409, feb 2023. doi:10.1016/j.addma.2023.103409

[42] Matthew Nelson, Vahid Barzegar, Simon Laflamme, Chao Hu, Austin R.J. Downey, Jason D. Bakos, Adam Thelen, and Jacob Dodson. Multi-step ahead state estimation with hybrid algorithm for high-rate dynamic systems. *Mechanical Systems and Signal Processing*, 182:109536, jan 2023. doi:10.1016/j.ymssp.2022.109536

[41] Corinne Smith, Austin R.J. Downey, and John McCain. An inexpensive, open-source, remote water level monitoring solution for dam safety. *The Journal of Dam Safety - Association of State Dam Safety Officials ASDSO*, 19(4), 2022

[40] Matthew Nelson, Simon Laflamme, Chao Hu, Adriane G Moura, Jonathan Hong, Austin Downey, Peter Lander, Yang Wang, Erik Blasch, and Jacob Dodson. Generated datasets from dynamic reproduction of projectiles in ballistic environments for advanced research (DROPBEAR) testbed. *IOP SciNotes*, 3(4):044401, nov 2022. doi:10.1088/2633-1357/aca0d2

[39] Jong-Hyun Jeong, Hongki Jo, Simon Laflamme, Jian Li, Austin Downey, Caroline Bennett, William Collins, Sdiq Anwar Taher, Han Liu, and Hyung-Jo Jung. Automatic control of AC bridge-based capacitive strain sensor interface for wireless structural health monitoring. *Measurement*, 202:111789, oct 2022. doi:10.1016/j.measurement.2022.111789

[38] Sdiq Anwar Taher, Jian Li, Jong-Hyun Jeong, Simon Laflamme, Hongki Jo, Caroline Bennett, William N. Collins, and Austin R. J. Downey. Structural health monitoring of fatigue cracks for steel bridges with wireless large-area strain sensors. *Sensors*, 22(14):5076, jul 2022. doi:10.3390/s22145076

[37] Corinne Smith, Joud Satme, Jacob Martin, Austin R.J. Downey, Nikolaos Vitzilaios, and Jasim Imran. UAV rapidly-deployable stage sensor with electro-permanent magnet docking mechanism for flood monitoring in undersampled watersheds. *HardwareX*, 12:e00325, oct 2022. doi:10.1016/j.ohx.2022.e00325

[36] Hung-Tien Huang, Austin R.J. Downey, and Jason D. Bakos. Audio-based wildfire detection on embedded systems. *Electronics*, 11(9), 2022. doi:10.3390/electronics11091417

[35] Han Liu, Simon Laflamme, Jian Li, Caroline R Bennett, William Collins, David Eisenmann, Austin Downey, Paul Ziehl, and Hongki Jo. Investigation of textured sensing skin for monitoring fatigue cracks on fillet welds. *Measurement Science and Technology*, apr 2022. doi:10.1088/1361-6501/ac6935

[34] Yanzhou Fu, Austin R.J. Downey, Lang Yuan, Tianyu Zhang, Avery Pratt, and Yunusa Balogun. Machine learning algorithms for defect detection in metal laser-based additive manufacturing: A review. *Journal of Manufacturing Processes*, 75:693–710, mar 2022. doi:10.1016/j.jmapro.2021.12.061

[33] Han Liu, Simon Laflamme, Jian Li, Caroline Bennett, William Collins, Austin Downey, Paul Ziehl, and Hongki Jo. Investigation of surface textured sensing skin for fatigue crack localization and quantification. *Smart Materials and Structures*, 30(10):105030, sep 2021. doi:10.1088/1361-665x/ac221a

[32] Han Liu, Simon Laflamme, Jian Li, Caroline Bennett, William N. Collins, Austin Downey, Paul Ziehl, and Hongki Jo. Soft elastomeric capacitor for angular rotation sensing in steel components. *Sensors*, 21(21):7017, oct 2021. doi:10.3390/s21217017

[31] Sabrina Carroll, Joud Satme, Shadhan Alkharusi, Nikolaos Vitzilaios, Austin Downey, and Dimitris Rizos. Drone-based vibration monitoring and assessment of structures. *Applied Sciences*, 11(18):8560, August 2021. doi:10.3390/app11188560

[30] Yanzhou Fu, Austin Downey, Lang Yuan, Avery Pratt, and Yunusa Balogun. In situ monitoring for fused filament fabrication process: A review. *Additive Manufacturing*, 38:101749, feb 2021. doi:10.1016/j.addma.2020.101749

[29] Yu Hui Lui, Meng Li, Austin Downey, Sheng Shen, Venkat Pavan Nemani, Hui Ye, Collette VanElzen, Gaurav Jain, Shan Hu, Simon Laflamme, and Chao Hu. Physics-based prognostics of implantable-grade lithium-ion battery for remaining useful life prediction. *Journal of Power Sources*, 485:229327, feb 2021. doi:10.1016/j.jpowsour.2020.229327

[28] Vahid Barzegar, Simon Laflamme, Austin Downey, Meng Li, and Chao Hu. Numerical evaluation of a novel passive variable friction damper for vibration mitigation. *Engineering Structures*, 220:110920, oct 2020. doi:10.1016/j.engstruct.2020.110920

[27] Austin Downey, Jonathan Hong, Jacob Dodson, Michael Carroll, and James Scheppegrell. Millisecond model updating for structures experiencing unmodeled high-rate dynamic events. *Mechanical Systems and Signal Processing*, 138:106551, April 2020. doi:10.1016/j.ymssp.2019.106551

[26] Jin Yan, Austin Downey, An Chen, Simon Laflamme, and Sammy Hassan. Capacitance-based sensor with layered carbon-fiber reinforced polymer and titania-filled epoxy. *Composite Structures*, 227:111247, 2019. doi:10.1016/j.compstruct.2019.111247

[25] Jonathan Hong, Jacob Dodson, Simon Laflamme, and Austin Downey. Transverse vibration of clamped-pinned-free beam with mass at free end. *Applied Sciences*, 9(15):2996, jul 2019. doi:10.3390/app9152996

[24] Austin Downey, Anna Laura Pisello, Elena Fortunati, Claudia Fabiani, Francesca Luzi, Luigi Torre, Filippo Ubertini, and Simon Laflamme. Durability and weatherability of a styrene-ethylene-butylene-styrene (SEBS) block copolymer-based sensing skin for civil infrastructure applications. *Sensors and Actuators A: Physical*, 293:269–280, jul 2019. doi:10.1016/j.sna.2019.04.022

[23] Jin Yan, Austin Downey, Alessandro Cancelli, Simon Laflamme, An Chen, Jian Li, and Filippo Ubertini. Concrete crack detection and monitoring using a capacitive dense sensor array. *Sensors*, 19(8):1843, April 2019. doi:10.3390/s19081843

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[7] Austin Downey, Antonella D'Alessandro, Filippo Ubertini, and Simon Laflamme. Model-assisted crack detection and localization in multifunctional concrete doped with mwcnts. *Engineering Mechanics Institute 2018*, June 2018

[6] Austin Downey, MohammadKazem Sadoughi, Jin Yan, Chao Hu, and An Chen. Progress towards a sensing skin enabling self-sensing for structural components. *Engineering Mechanics Institute 2018*, May 2018

[5] Austin Downey, Simon Laflamme, Filippo Ubertini, and Partha Sarkar. Experimental wind-tunnel study of a sensing skin for damage detection on a wind turbine blade. *North American Wind Energy Academy (NAWEA)*, September 2017

[4] Austin Downey, Simon Laflamme, and Filippo Ubertini. A data-driven approach for damage detection in wind turbine blades using a dense array of soft elastomeric capacitors. *Engineering Mechanics Institute 2017*, June 2017

[3] Austin Downey and Simon Laflamme. Dense array of soft elastomeric capacitors for feature extraction on wind turbine blades. *Engineering Mechanics Institute 2016*, May 2016

[2] Austin Downey and Simon Laflamme. Damage detection of wind turbine blades using a root based network of thin film sensors. *42nd Annual Review of Progress in Quantitative Nondestructive Evaluation*, July 2015

[1] Austin Downey, Hussam Saleem, and Simon Laflamme. Highly elastic sensing skin for mesosurface strain monitoring. *Engineering Mechanics Institute 2015*, June 2015

Conference Presentations

- Conference talks presented by Austin Downey at conferences. The associated publications are listed above in their appropriate category.

[40] Josh McGuire, Joud N. Satme, Daniel Coble, Austin R. J. Downey, Jason Bakos, Ryan Yount, and Arion Pons. Rank reduction of LSTM models for online vibration signal compensation on edge computing devices. In Lynne L. Grewe, Erik P. Blasch, and Ivan Kadar, editors, *Signal Processing, Sensor/Information Fusion, and Target Recognition XXXIV*, page 37. SPIE, May 2025. doi:10.1117/12.3052966

[39] Md Asifuzzaman Khan, Matthew Burnett, Austin R. J. Downey, Joud N. Satme, and Jasim Imran. Uav deployable buoy-style sensor for in situ water quality monitoring. In Weilin Hou, Linda J. Mullen, and Jarom Jackson, editors, *Ocean Sensing and Monitoring XVII*, page 14. SPIE, May 2025. doi:10.1117/12.3052963

[38] Daniel Hancock, David P. Wamai, Md Asifuzzaman Khan, Winford Janvrin, Austin R. J. Downey, Mohammed Baalousha, and Thomas M. Crawford. Continuous water quality monitoring using field deployable NMR and explainable AI. In Weilin Hou, Linda J. Mullen, and Jarom Jackson, editors, *Ocean Sensing and Monitoring XVII*, page 15. SPIE, May 2025. doi:10.1117/12.3052964

[37] Samuel Roberts, Yanzhou Fu, Joud Satme, Daniel Kiracofe, Austin R. J. Downey, and Lang Yuan. Modeling post-process indenting using the discrete element method for particle density control in additively manufactured dampers. In Serife Tol, Mostafa A. Nouh, Jinkyu Yang, Guoliang Huang, Xiaopeng Li, Yangyang Chen, and Christopher Sugino, editors, *Active and Passive Smart Structures and Integrated Systems XIX*, page 60. SPIE, May 2025. doi:10.1117/12.3051102

[36] Trotter Roberts, Joud Satme, Puja Chowdhury, Austin R. J. Downey, and Jason Bakos. Resource-efficient FPGA-based machine learning control for active structural damping in shock environments. In Serife Tol, Mostafa A. Nouh, Jinkyu Yang, Guoliang Huang, Xiaopeng Li, Yangyang Chen, and Christopher Sugino, editors, *Active and Passive Smart Structures and Integrated Systems XIX*, page 19. SPIE, May 2025. doi:10.1117/12.3049917

[35] Emmanuel Ogunniyi, Austin R. J. Downey, Han Liu, Simon Laflamme, and Subramani Sockalingam. Impact monitoring of embedded batteries in sandwich composites with integrated soft elastomeric capacitors. In Piervincenzo Rizzo, Zhongqing Su, Fabrizio Ricci, and Kara J. Peters, editors, *Health Monitoring of Structural and Biological Systems XIX*, page 75. SPIE, May 2025. doi:10.1117/12.3051262

[34] Yanzhou Fu, Matthew Whetham, Austin R. J. Downey, Lang Yuan, and Gurcan Comert. A study of online melt pool, plume, and spatter tracking in laser powder bed fusion using dbscan. In Christopher Niezrecki and Saman Farhangdoust, editors, *Digital Twins, AI, and NDE for Industry Applications and Energy Systems 2025*, page 21. SPIE, May 2025. doi:10.1117/12.3051110

[33] David P. Wamai, Austin R. J. Downey, Hasan Borke Birgin, Antonella D'Alessandro, and Filippo Ubertini. Low-cost biphasic dc data acquisition for monitoring cementitious self-sensing materials. In Maria Pina Limongelli, Ching Tai Ng, and Didem Ozevin, editors, *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2025*, page 30. SPIE, May 2025. doi:10.1117/12.3050548

[32] Nathaniel Cooper, George Anthony, Jarett Peskar, Austin R Downey, and Kristen Booth. Data assimilation in a Modelica framework for optimizing battery longevity in electric aircraft. In *AIAA SCITECH 2025 Forum*, page 2706, 2025. doi:10.2514/6.2025-2706

[31] Winford Janvrin, Parker Huggins, Austin R Downey, and Sang Hee Won. Predicting sustainable aviation fuel mixtures using low-resolution nuclear magnetic resonance. In *AIAA SCITECH 2025 Forum*, page 0164, 2025. doi:10.2514/6.2025-0164

[30] Austin R.J. Downey and Xinyu Huang. Battery pack safety testing and system-level integration. *2024 South Carolina Fraunhofer USA Battery Symposium*, 2024

[29] Parker Huggins, Jacob S. Martin, Austin R.J. Downey, and Sang Hee Won. Interpretable machine learning for predicting the derived cetane number of jet fuels using compact TD-NMR. *Sensors and Actuators B: Chemical*, 426:137018, March 2025. doi:10.1016/j.snb.2024.137018

[28] Austin R. J. Downey, Eleonora Maria Tronci, Puja Chowdhury, and Daniel Coble. *Physics-Informed Machine Learning Part II: Applications in Structural Response Forecasting*, pages 63–66. Springer Nature Switzerland, August 2024. doi:10.1007/978-3-031-68142-4_8

[27] Yanzhou Fu, Braden Priddy, Austin Downey, and Lang Yuan. Real-time splatter tracking in laser powder bed fusion additive manufacturing. In Norbert G. Meyendorf, Ripi Singh, and Christopher Niezrecki, editors, *NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE*. SPIE, apr 2023. doi:10.1117/12.2658544

[26] Emmanuel A. Ogunniyi, Han Liu, Austin R. J. Downey, Simon Laflamme, Jian Li, Caroline Bennett, William Collins, Hongki Jo, and Paul Ziehl. Soft elastomeric capacitors with an extended polymer matrix for strain sensing on concrete. In Zhongqing Su, Maria Pina Limongelli, and Branko Glisic, editors, *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2023*. SPIE, apr 2023. doi:10.1117/12.2658568

[25] Joud N. Satme, Daniel Coble, Hung-Tien Huang, Austin R. J. Downey, and Jason D. Bakos. Non-linear vibration signal compensation technique for UAV-deployable sensor packages with edge computing. In Zhongqing Su, Maria Pina Limongelli, and Branko Glisic, editors, *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2023*. SPIE, apr 2023. doi:10.1117/12.2658563

[24] Austin Downey and Jason D. Bakos. *High-Rate Structural Health Monitoring: Part-II Embedded System Design*, pages 105–108. Springer Nature Switzerland, 2023. doi:10.1007/978-3-031-34946-1_12

[23] Jacob Dodson, Austin Downey, and Simon Laflamme. High-rate structural health monitoring: Part-I introduction & data. In *IMAC 41*, February 2023

[22] Puja Chowdhury, Joud Satme, Ryan Yount, Austin R.J. Downey, Mohammad Sadik Khan, and Jasim Imran. Spatial mapping of soil saturation levels using UAV deployable smart penetrometers. *ASCE Geo-Institute 7th Annual Live Streaming Web Conference*, December 2022

[21] Daniel Coble, Joud Satme, Ehsan Kabir, Austin R.J. Downey, Jason D. Bakos, David Andrews, Miaoqing Huang, Adrine Moura, and Jacob Dodson. Towards online structural state-estimation with sub-millisecond latency. *92nd Shock and Vibration Symposium*, September 2022

[20] Austin Downey, Jason Smith, Alysson Mondoro, and Benjamin Grisso. Multi-model data assimilation for structures. *ASME 2020 Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS 2020)*, September 2020

[19] Seong Hyeon Hong, Claire Drnek, Austin Downey, Yi Wang, Jacob Dodson, and Jonathan Hong. Real-time model updating algorithm for structures experiencing high-rate dynamic events. In *Proceedings of the ASME 2020 Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS 2020)*, pages SMASIS2020–2439. ASME, 2020. doi:10.1115/smasis2020-2439

[18] Austin Downey, Jonathan Hong, Bryan Joyce, Jacob Dodson, Chao Hu, and Simon Laflamme. Methodology for real-time state estimation at unobserved locations for structures experiencing high-rate dynamics. In Fu-Kuo Chang and Fotis Kopsaftopoulos, editors, *Structural Health Monitoring 2019*, pages 3375–3381. DEStech Publications, Inc., nov 2019. doi:10.12783/shm2019/32498

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[16] Jin Yan, Austin Downey, Alessandro Cancelli, Simon Laflamme, and An Chen. Detection and monitoring of cracks in reinforced concrete using an elastic sensing skin. In *Structures Congress 2019; Bridges, Tunnels, and Other Transportation Structures*. American Society of Civil Engineers, apr 2019. doi:10.1061/9780784482230.009

[15] Austin Downey, MohammadKazem Sadoughi, Liang Cao, Simon Laflamme, and Chao Hu. Passive variable friction damper for increased structural resilience to multi-hazard excitations. In *Volume 2A: 44th Design Automation Conference*. ASME, aug 2018. doi:10.1115/detc2018-85207

[14] Austin Downey, Antonella D'Alessandro, Filippo Ubertini, and Simon Laflamme. Model-assisted crack detection and localization in multifunctional concrete doped with mwcnts. *Engineering Mechanics Institute 2018*, June 2018

[13] Austin Downey, MohammadKazem Sadoughi, Jin Yan, Chao Hu, and An Chen. Progress towards a sensing skin enabling self-sensing for structural components. *Engineering Mechanics Institute 2018*, May 2018

[12] Austin Downey, Anna Laura Pisello, Elena Fortunati, Claudia Fabiani, Francesca Luzi, Luigi Torre, Filippo Ubertini, and Simon Laflamme. Durability assessment of soft elastomeric capacitor skin for SHM of wind turbine blades. In Peter J. Shull, editor, *Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XII*, volume 10599, pages 10599–11. SPIE, mar 2018. doi:10.1117/12.2296518

[11] Austin Downey, Antonella D'Alessandro, Filippo Ubertini, and Simon Laflamme. Crack detection in rc structural components using a collaborative data fusion approach based on smart concrete and large-area sensors. In Hoon Sohn, editor, *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2018*, volume 10598, pages 10598–13. SPIE, mar 2018. doi:10.1117/12.2296695

[10] Jin Yan, Xiaosong Du, Austin Downey, Alessandro Cancelli, Simon Laflamme, Leifur Leifsson, An Chen, and Filippo Ubertini. Surrogate model for condition assessment of structures using a dense sensor network. In Hoon Sohn, editor, *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2018*, volume 10598, pages 10598–9. SPIE, mar 2018. doi:10.1117/12.2296711

[9] Austin Downey, Simon Laflamme, Filippo Ubertini, and Partha Sarkar. Experimental wind-tunnel study of a sensing skin for damage detection on a wind turbine blade. *North American Wind Energy Academy (NAWEA)*, September 2017

[8] Austin Downey, Jin Yan, Simon Laflamme, and An Chen. Dynamic reconstruction of in-plane strain maps using a two-dimensional sensing skin. In *Structural Health Monitoring 2017*. DEStech Publications, Inc., sep 2017. doi:10.12783/shm2017/14019

[7] Austin Downey, Simon Laflamme, and Filippo Ubertini. A data-driven approach for damage detection in wind turbine blades using a dense array of soft elastomeric capacitors. *Engineering Mechanics Institute 2017*, June 2017

[6] Austin Downey, Simon Laflamme, Filippo Ubertini, Heather Sauder, and Partha Sarkar. Damage detection of wind turbine blade using hybrid dense sensor networks. In *XIV Conference of the Italian Association for Wind Engineering*, pages 97–98, September 2016

[5] Austin Downey and Simon Laflamme. Dense array of soft elastomeric capacitors for feature extraction on wind turbine blades. *Engineering Mechanics Institute 2016*, May 2016

[4] Simon Laflamme, Jeramie Vens, Daji Qiao, Austin Downey, and Jian Li. Dense network of large area electronics for fatigue crack detection and localization. In *Structural Health Monitoring 2015*. Destech Publications, 2015. doi:10.12783/shm2015/376

[3] Austin Downey and Simon Laflamme. Damage detection of wind turbine blades using a root based network of thin film sensors. *42nd Annual Review of Progress in Quantitative Nondestructive Evaluation*, July 2015

[2] Austin Downey, Hussam Saleem, and Simon Laflamme. Highly elastic sensing skin for mesosurface strain monitoring. *Engineering Mechanics Institute 2015*, June 2015

[1] Liang Cao, Austin Downey, Simon Laflamme, Douglas Taylor, and James Ricles. A novel variable friction device for natural hazard mitigation. In *Proc. Tenth US National Conference on Earthquake Engineering*, 2014

Invited Presentations

[23] Austin R.J. Downey. Water quality monitoring using field deployable NMR. Presented at the University of South Carolina - Environmental Health Sciences Spring 2025 Seminar Series, February 19, 2025

[22] Austin R.J. Downey. Advances in machine learning at the edge for enhanced structural health monitoring and control in swap-constrained environments. Presented at the University of South Florida - Rising Innovators in Scholarly Excellence (RISE) Speaker Series, February 4, 2025

[21] Austin R.J. Downey. Battery modeling and prognostics for improved safety and longevity. Presented at Chalmers University of Science and Technology - Automatic Controls Group - Invited Talk, November 22, 2024

[20] Austin R.J. Downey. UAV-based sensor deployment and edge computing for rapid infrastructure assessment. Presented at the Construction and Building Engineering Department, Arab Academy for Science, Technology, and Maritime Transport, October 28, 2024

[19] Austin R.J. Downey. Ai for civil infrastructure: How ai can be applied to civil infrastructure with case studies. Presented at The AI Institute at the University of South Carolina invited lecture series, October 4, 2024

[18] Austin R.J. Downey. Chalmers fulbright - the high-rate challenge. Presented at Chalmers University of Science and Technology invited lecture series, June 20, 2024

[17] Austin R.J. Downey. Collaborating through reus – a lehigh facility user experience. Presented at the NHERI Researchers Workshop: Mitigation of Natural Hazards Through Component Testing, Advanced Simulation, and Large-Scale Multi-Directional Experiments at Lehigh University, November 16, 2023

[16] Austin R.J. Downey. Brief: Digital twin testbed for advanced battery management and utilization in naval system. Presented at the Joint DoD Power Sources Technical Working Group and Military Power Sources Consortium Meeting, May 24, 2023

[15] Austin R.J. Downey. Developing high-rate digital twins for structures under shock loading. Presented at the University of Perugia - Structural Engineering Seminar Series, October 26, 2022

[14] Austin R.J. Downey. High-rate model updating for structures experiencing shock. Presented at the AFRL Munitions Directorate Summer Faculty Fellowship Program - Seminar, July 14, 2022

[13] Austin R.J. Downey. Real-time model updating for structures experiencing high-rate dynamic events. Presented at the University of Strathclyde, December 11, 2020

[12] Austin R.J. Downey. Multi model data assimilation for naval ship structures. Presented at the Summer Faculty Research Program (NSWC-Carderock division), August 3, 2020

[11] Austin R.J. Downey. Progress towards real-time decision-making for structures experiencing high-rate dynamics. Presented at the AFRL Munitions Directorate Summer Faculty Fellowship Program - Seminar, July 23, 2019

[10] Austin R.J. Downey. Solutions for mesoscale monitoring. Presented at the University of Virginia Seminar Series, May 2, 2019

[9] Austin R.J. Downey. Solutions for mesoscale monitoring. Presented at the NHERI Lehigh Seminar Series, March 28, 2019

[8] Austin R.J. Downey. Self-sensing structural materials for the condition monitoring of structures. Presented at the Intelligent Infrastructure Engineering seminars - Iowa State University, March 3, 2018

[7] Austin R.J. Downey. Solutions for mesoscale monitoring. Presented at the System Reliability and Safety Laboratory at Iowa State University, February 8, 2018

[6] Austin R.J. Downey. Monitoring of historical structures in central italy. Presented at Guest lecture for CE 101 at Iowa State University, November 29, 2017

[5] Austin R.J. Downey. Advancements in the field of smart-materials for structural health monitoring. Presented at Guest lecture for CE 549 at Iowa State University, November 6, 2017

[4] Austin R.J. Downey. A data-driven approach for damage detection in large structures using a dense array of soft elastomeric capacitors. Presented at the Iowa State University Structure Seminar Series, March 15, 2017

[3] Austin R.J. Downey. Algorithm for damage detection in wind turbine blades using a hybrid dense sensor network with feature level data fusion. Presented at the Wind Energy Science, Engineering and Policy (WESEP), Real-Time Research Collaborative, February 13, 2017

[2] Austin R.J. Downey. Smart materials for structural health monitoring. Presented at the University of Perugia Working Group on Smart Structures and Building Physics, October 20, 2016

[1] Austin R.J. Downey. Large area sensors for the monitoring of wind turbine blades. Presented at the Wind Energy Science, Engineering and Policy (WESEP), Real-Time Research Collaborative, May 12, 2015

Patents

[3] Austin Downey and Sang Hee Won. Time domain NMR for obtaining cetane number of liquid fuels, June 26 2025. US Patent App. 18/890,868

[2] Austin Robert Johnson Downey, Simon Laflamme, and Randall Lee Geiger. Systems and methods for leading edge sensors in wind turbines, July 28 2020. US Patent 10,724,504

[1] Austin Downey, Simon Laflamme, and Douglas P Taylor. Apparatus, method, and system for high capacity band brake type variable friction damping of movement of structures, February 20 2018. US Patent 9,896,836

Posters

- Typically undergraduate poster events or non-conference events like workshops or society meetings.

[68] Joshua McGuire, Joud Satme, Daniel Coble, Jason Bakos, and Austin Downey. Online vibration signal compensation with LSTM and low-rank approximation. USC Summer Research Symposium, July 2025

[67] Thienan Hoang, Austin Downey, Mumin Adhami, Mateo Garcia-Sandoval, Yanzhou Fu, and Lang Yuan. Real-time thermal image topological-data analysis for quality control and defect detection in laser powder bed fusion additive manufacturing. USC Summer Research Symposium, July 2025

[66] Mark Zheng, Md Asifuzzaman Khan, Joud N. Satme, Amanda Sark, Korebami O. Adebajo, Ryan Yount, and Austin R.J. Downey. Stereo vision UAV tracking for autonomous structural health monitoring sensor deployment. USC Summer Research Symposium, July 2025

[65] Nolan Shute, Asifuzzaman Khan, Mark Zheng, Joud Satme, and Austin R.J. Downey. Ground camera packages for UAV distance calculation. USC Summer Research Symposium, July 2025

[64] Patrick Wynne, Emmanuel Ogunniyi, and Austin R.J. Downey. Towards self-sensing flapping-wing UAV development. USC Summer Research Symposium, July 2025

[63] Amanda Sark, Hakan Godoy, Joud N. Satme, Austin R.J. Downey, Jasim Imran, and Negash Begashaw. Assessment of uav-deployed epoxy-bonded vibration sensors on concrete structures. USC Summer Research Symposium, July 2025

[62] Kyle Pacheco, Mumin Adhami, and Austin Downey. Design of a camera housing with integrated lighting for in situ monitoring in laser powder bed fusion additive manufacturing. Summer Program for Research Interns / USC Summer Research Symposium, July 2025

[61] Miriam Morales, Hampton DuBose, Matt Whetham, and Austin Downey. Expansion of the smr thermal loop. Summer Program for Research Interns / USC Summer Research Symposium, July 2025

[60] Jackie Yang, Mumin Adhami, Charlie Buren, and Austin Downey. Designing mounts for in-situ powder bed fusion monitoring. Summer Program for Research Interns / USC Summer Research Symposium, July 2025

[59] Logan Pacheco, Asif Khan, , and Austin Downey. Modeling a compact electronics tray for a UAV deployable in-situ water quality sensor. Summer Program for Research Interns / USC Summer Research Symposium, July 2025

[58] Delbert Siuhi, Matthew Burnett, Aditya Anandkumar, and Austin Downey. Modular UAV wing design using standardized parts and 3D printing. Summer Program for Research Interns / USC Summer Research Symposium, July 2025

[57] Cebastione Bailey, George Anthony, Connor Madden, Jarrett Peskar, and Austin R.J. Downey. 100 kW battery lab at the university of south carolina. Battery Safety Workshop, August 2025

[56] Connor Madden, Jarrett Peskar, Austin R.J. Downey, Kerry Sado, and Jamil Khan. Supervised learning for electro-thermal lithium-ion battery modeling via hybrid pulse power characterization. Battery Safety Workshop, August 2025

[55] Josiah Worch, Kerry Sado, Austin R.J. Downey, Jamil Khan, and Enrico Santi. Preventing battery cooling failures with blockage detection and rectification. Battery Safety Workshop, August 2025

[54] Samuel Roberts, Yanzhou Fu, Joud N. Satme, Austin R.J. Downey, and Lang Yuan. Discrete element modeling of additively manufactured particle dampers with variable particle packing density. Discover USC, March 2025

[53] Qi Zheng, Joud N. Satme, Austin R.J. Downey, Korebami O. Adebajo, Ryan Yount, and Asifuzzaman Khan. Development of an autonomous UAV structural health monitoring sensor deployment system using machine learning algorithms. Discover USC, March 2025

[52] Patrick Wynne, Erika Hagen, Austin R.J. Downey, and Bridget Armstrong. Methodologies of pouring PATCH silicone molds. Discover USC, March 2025

[51] Korebami Adebajo and Austin Downey. A multi-domain modeling approach to electric aircraft battery degradation: Role of charging parameters. Discover USC, March 2025

[50] Jarrett Peskar, George Anthony, Kerry Sado, Austin R.J. Downey, Jamil Khan, and Kristen Booth. Enabling safe battery system design through electro-thermal emulation. 2024 Battery Safety Workshop, August 2024

[49] George Anthony, Ryan Limbaugh, Jarrett Peskar, Thomas Stubbs, and Austin R.J. Downey. Full-scale battery pack degradation monitoring. 2024 Battery Safety Workshop, August 2024

[48] Richard Hainey, Leighton Gay, Josiah Worch, Kerry Sado, H.J Fought, Austin R.J. Downey, and Jamil Khan. Liquid cooling system for battery/electric testbed. 2024 Battery Safety Workshop, August 2024

[47] Korebami O. Adebajo, Nathaniel Cooper, and Austin R.J. Downey. Battery degradation prediction aided by multi-domain modeling. 2024 Battery Safety Workshop, August 2024

[46] Ryan Limbaugh, George Anthony, and Austin Downey. 30Q lithium-ion cell cycling with strain monitoring. 2024 Battery Safety Workshop, August 2024

[45] David Wamai, Austin R.J. Downey, and Jason D. Bakos. Hardware development for a NMR signal processing instrument. USC Summer Research Symposium, July 2024

[44] Qi Zheng, Joud Satme, and Austin Downey. Camera-assisted UAV sensor package deployment system. USC Summer Research Symposium, July 2024

[43] Matthew Burnett, Gabriel Barahona, Mohammed Abdelwahab, and Austin R.J. Downey. An in-situ sensor node for spatial and temporal monitoring of water quality. USC Summer Research Symposium, July 2024

[42] Ethan Ibarra, Austin Downey, Joud Satme, and Ryan Yount. Finite element analysis of a unmanned aerial vehicle deployment system. USC Summer Research Symposium, July 2024

[41] Sydney Morris, Malichi, Flemming, and Austin R.J. Downey. Species: Smart penetrometer with edge computing and intelligent embedded system. USC Summer Research Symposium, July 2024

[40] Samuel Roberts, Joud N. Satme, Gabriel Smith, Joseph Johnson, and Austin R.J. Downey. Finite element analysis of usc walking bridges. USC Summer Research Symposium, July 2024

[39] Nicholas Liger, Jasim Imran, and Austin Downe. Wireless IoT water height sensor. Discover USC, March 2024

[38] Korebami Adebajo, Austin Downey, Peskar Jarett, and Anthony George. Multi-domain modeling of an electric aircraft. Discover USC, March 2024

[37] Joseph Johnson and Austin Downey. Rain collection and environmental sensor package. Discover USC, March 2024

[36] Winford Janvrin, Austin Downey, and Jasim Imran. Flow through nuclear magnetic resonance. Discover USC, March 2024

[35] Jackie Wang, David Wamai, Jason D. Bakos, and Austin R.J. Downey. Excitation signal generation for a compact nuclear magnetic response sensor. Discover USC, March 2024

[34] Parker Huggins, Jacob Martin, Austin Downey, and Sang Hee Won. A compact TD-NMR system for the estimation of jet fuel DCN using interpretable machine learning. Discover USC, March 2024

[33] John White, Connor Madden, George Anthony, and Austin Downey. Battery expansion measured with digital image correlation. Discover USC, March 2024

[32] Nickola Simpson, Daniel Salazar, Gurcan Comert, Austin R.J. Downey, Jason D. Bakos, and Negash Begashaw. Investigating structural dynamic identification using time series topological features. ADAPT in SC; the South Carolina EPSCoR Conference, March 2024

[31] Bariat Shuaib, Daniel Salazar, Gurcan Comert, Austin R.J. Downey, Jason D. Bakos, and Negash Begashaw. Utilizing change point detection for structural dynamic response classification. ADAPT in SC; the South Carolina EPSCoR Conference, March 2024

[30] Daniel Coble and Austin R.J. Downey. Online damage detection using topological data analysis. USC Summer Research Symposium, July 2023

[29] Christopher Heaps, Jasim Imran, and Austin R.J. Downey. Measuring precipitation through raindrop conductivity. USC Summer Research Symposium, July 2023

[28] David Wamai, Jackie Wang, Jason Bakos, and Austin R.J. Downey. Development of an FPGA-based signal processing system for a compact nmr measurement system part-II. USC Summer Research Symposium, July 2023

[27] Jackie Wang, David Wamai, and Austin R.J. Downey. Development of an FPGA-based signal processing system for a compact nmr measurement system part-I. USC Summer Research Symposium, July 2023

[26] Jarrett Peskar, Nicholas Liger, George Anthony, Austin R.J. Downey, and Jamil Khan. Coupled electro-thermo battery emulator. 2023 Battery Safety Workshop, June 2023

[25] George Anthony, Korebami Adebajo, Austin Downey, and Nathaniel Cooper. Power electronics testbed of evtol vehicles. 2023 Battery Safety Workshop, June 2023

[24] Yanzhou Fu, Braden Priddy, Austin Downey, and Lang Yuan. Real-time splatter tracking in laser powder bed fusion additive manufacturing. In Norbert G. Meyendorf, Ripi Singh, and Christopher Niezrecki, editors, *NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE*. SPIE, apr 2023. doi:10.1117/12.2658544

[23] Austin Downey. Online structural state-estimation in extreme dynamic environments. National Academy of Engineering EU-US Frontiers of Engineering Symposium (NAE EU-US FOE), October 2022

[22] Liang Cao, Safwan al Subaihawi, Thomas Marullo, James Ricles, Austin R.J. Downey, and Simon Laflamme. 3D real-time hybrid simulation studies of a tall building with novel tuned mass friction dampers for wind hazard mitigation. Natural Hazards Research Summit 2022, October 2022

[21] Daniel Coble and Austin R. J. Downey. Data-driven modeling of structures in high-rate dynamic environments. AFOSR DDIP Program Review, September 2022

[20] Alexander B. Vereen and Austin R. J. Downey. Physics-based real-time model updating for structures in high-rate dynamic environments. AFOSR DDIP Program Review, September 2022

[19] Daniel Coble, Liang Cao, Austin Downey, and James Ricles. Research experiences for undergraduates (REU), NHERI 2022: Deep learning-based friction modeling of dry interfaces for structural dampers, 2022. doi:10.17603/DS2-P659-3295

[18] Alexander Vereen, Austin R.J. Downey, Jacob Dodson, and Adriane Moura. Development of microsecond health monitoring technology. Air Force Research Lab Scholars Program, July 2022

[17] Corinne Smith, John McCain, Austin R.J. Downey, and Jasim Imran. IOT water level monitoring system for high hazard dams. USC Summer Research Symposium, July 2022

[16] Zachary Ziehl, Yanzhou Fu, and Austin R.J. Downey. Decision making for fused filament fabrication. UofSC Summer Research Symposium, July 2022

[15] Ryan Yount, Joud Satme, Austin R.J. Downey, and Jasim Imran. Drone deliverable vibration sensor. UofSC Summer Research Symposium, July 2022

[14] Parker Huggins, Jake Martin, Austin Downey, and Sang Hee Won. Machine learning for NMR-based fuel classification. UofSC Summer Research Symposium, July 2022

[13] Austin Downey, Lang Yuan, and Yanzhou Fu. In situ monitoring and real-time quality validation for additive manufacturing. Savannah River National Laboratory Board of Supervisors Meeting, June 2022

[12] Corinne Smith and Austin R.J. Downey. A UAV rapidly-deployable stage sensor package for flood monitoring in undersampled watersheds. Discover USC, July 2022

[11] Daniel Coble and Austin Downey. High-rate machine learning for structural state estimation. Discover USC, March 2022

[10] Puja Chowdhury, Vahid Barzegar, Joud Satme, Austin Downey, Simon Laflamme, Jason D. Bakos, and Chao Hu. Deterministic and low-latency time-series forecasting of nonstationary signals. SPIE Smart Structures + Nondestructive Evaluation, March 2022

[9] Joud Satme and Austin Downey. Structural health monitoring using a drone delivered sensor package. Discover USC, March 2021

[8] Nicholas Peraino and Austin Downey. Identification of objects with passively sensing artificial seaweed. Discover USC, March 2021

[7] Jason Smith and Austin Downey. Multi-event model updating for ship structures. Discover USC, March 2021

[6] Michael Carroll and Austin Downey. Microsecond structural health monitoring. Air Force Research Lab Scholars Program, July 2019

[5] Mitchell Stiles, Liang Chao, James Ricles, and Austin Downey. Fabrication of a semi-active friction damping device. Research Experiences for Undergraduates in Multi Hazard Engineering, July 2019

[4] Claire Drnek and Austin Downey. Gait analysis and person identification using human-structure interaction. Discover USC, April 2019

[3] Austin Downey, Simon Laflamme, and Filippo Ubertini. Data fusion of dense sensor networks for damage detection in wind turbine blades. North American Wind Energy Academy (NAWEA), September 2017

[2] Austin Downey and Simon Laflamme. Smart sensory membrane for wind turbine blades. Iowa State University Wind Energy Industry Symposium, September 2015

[1] Liang Cao, Austin Downey, Simon Laflamme, Douglas Taylor, and James Ricles. A novel variable friction device for natural hazard mitigation. Iowa State University Graduate Student Poster Competition, November 2014

Open-source Projects (selected)

Open Source Hardware

[8] ARTS-Lab. Compact-NMR. GitHub. URL: `https://github.com/ARTS-Laboratory/Compact-NMR`

[7] ARTS-Lab. Drone delivered vibration sensor. GitHub. URL: https://github.com/ARTS-Laboratory/Drone-Delivered-Vibration-Sensor

[6] ARTS-Lab. Smart penetrometer with edge computing and intelligent embedded systems. GitHub. URL: https://github.com/ARTS-Laboratory/Smart-Penetrometers-with-Edge-Computing-and-Intelligent-Embedded-Systems

[5] ARTS-Lab. UAV deployable stage height sensor. GitHub. URL: https://github.com/ARTS-Laboratory/UAV-Deployable-Stage-Height-Sensor

[4] David Wamai, Hasan Borke Birgin, Austin Downey, and Joud Satme. Biphasic data acquisition system. GitHub, July 2023. URL: https://github.com/ARTS-Laboratory/Biphasic-data-acquisition-system

[3] ARTS-Lab. Iot water level sensor. GitHub. URL: https://github.com/ARTS-Laboratory/IoT-Water-Level-Sensor

[2] ARTS-Lab. In-situ-water-quality-sensor. GitHub. URL: https://github.com/ARTS-Laboratory/In-Situ-Water-Quality-Sensor

[1] Austin Downey. SEC DAQ open source hardware design. GitHub, April 2018. URL: https://github.com/ARTS-Laboratory/SEC-DAQ-Open-Source-Hardware-Design

Open Source Software

[3] Daniel Coble and Austin Downey. LabVIEW-LSTM. GitHub, 2022. URL: https://github.com/ARTS-Laboratory/LabVIEW-LSTM

[2] Austin Downey. Labview FPGA sort. GitHub, December 2021. URL: https://github.com/ARTS-Laboratory/LabVIEW-FPGA-Sort

[1] Austin Downey. LabVIEW FPGA array-based linear algebra. GitHub, 2021. URL: https://github.com/ARTS-Laboratory/LabVIEW-FPGA-Array-Based-Linear-Algebra

Textbooks and Course Notes

[3] Austin Downey and Laura Micheli. Repository for vibration mechanics. URL: https://github.com/austindowney/Vibration-Mechanics

[2] Austin Downey. Machine learning for engineering problem solving. URL: https://github.com/austindowney/Machine-Learning-for-Engineering-Problem-Solving

[1] Austin Downey and Victor Giurgiutiu. Engineering control systems. URL: https://github.com/austindowney/Engineering-Control-Systems

Tutorials

[1] Austin Downey. Introduction to python for engineering problem-solving. URL: github.com/austindowney/Introduction-to-Python-for-Engineering-Problem-Solving

Mentorship and Advisement at the University of South Carolina

Current Ph.D. Students

[11] Josiah Worch; Mechanical Engineering, “Blockage Detection in Thermal Systems for Power Electronic Systems”, 2025 - present.

[10] Trotter Roberts; Mechanical Engineering, "Active Control of Structures Subjected to Shock", 2025 - present.

[9] Korebami Adebajo; Mechanical Engineering, "Aircraft-level Level System Design", 2025 - present.

[8] Ryan Yount; Mechanical Engineering, "Ship Level System Design", DoD-SMART fellowship, 2025 - present.

[7] Malichi Flemming; Mechanical Engineering, "Advanced Battery BMS Systems", 2025 - present.

[6] Mohsen Gol Zardian; Mechanical Engineering, "Topological Data Analysis for infrastructure inspection", 2025 - present.

[5] Asif Khan; Mechanical Engineering, "In situ hydrology sensing", 2025 - present.

[4] Nathaniel Cooper; Mechanical Engineering, "Fuel Cell Systems for Electric Aircraft", 2023 - present.

[3] Jarrett Peskar; Mechanical Engineering, "Electro-thermo Digital Twin of Lithium-ion Batteries", 2021 - present.

[2] Zhymir Thompson; Computer Science and Mechanical Engineering (Dual Majors; dual advised with Jason Bakos as minor co-advisor), "Generative Adversarial Network for Temporal Data Synthesis", 2021 - present.

[1] Joud Satme; Mechanical Engineering, "Real-time Computing at the Edge for High-rate Dynamics", 2021 - present.

Current M.S. Students

[2] Connor Madden; Mechanical Engineering, "Electro-thermal Battery Modeling", 2025 - present.

[1] Mumin Adhami, "In Situ Monitoring of Metal-based Additive Manufacturing", 2024 - present.

Graduated Doctor of Philosophy (Ph.D.)

[3] Emmanuel Ogunniyi; Mechanical Engineering, "Reduced Order Model-based Framework for Microsecond Model Updating of Two-Dimensional Structural Systems Using the Local Eigenvalue Modification Procedure", 2021- 2025.

[2] Puja Chowdhury; Mechanical Engineering, "Temporal Forecasting of High-Rate Dynamic Using Physics-Informed Machine Learning and Hardware-Software Co-Design", 2020 - 2024.

[1] Yanzhou Fu; Mechanical Engineering, "Real-time Product Structural Validation for Fused Filament Fabrication", 2019 - 2023.

Graduated Master of Science (M.S.)

[11] George Anthony; Mechanical Engineering, "Strain Sensing and Intelligent Load Management to Enhance Battery Lifespan and Safety in Electric Vehicle Applications", 2023 - 2025.

[10] Ryan Yount; Mechanical Engineering, "Frequency-Based Rapid Structural Damage Detection Using Embedded Edge Computing on Resource-Constrained Devices", 2023 - 2025.

[9] James Scheppegrell; Nuclear Engineering, “Hybrid Machine Learning and Comparison Error Minimization for Frequency Domain-based Rapid State Estimation in Structures Subjected to High-rate Boundary Change”, 2019 - 2025.

[8] Dan Hancock; Physics, “In-situ Compact Time-Domain Nuclear Magnetic Resonance for Real-Time Water Quality Monitoring”, 2023 - 2025. (Dual advised with Thomas Crawford in Physics).

[7] Richard Hailey; Mechanical Engineering, “Integrating Digital Twin Technology For Real Time Blockage Detection in Water Cooled Electronics”, 2022 - 2024.

[6] Braden Priddy; Mechanical Engineering, “Autonomous Real-time Model Updating within Digital Twin Frameworks for Thermal systems”, 2022 - 2024.

[5] Jacob Martin; Physics (dual advised/dual projects), “A method for single-Particle Magnetic Particle Spectroscopy with a Nanofabricated Coplanar Stripline” advised by Thomas Crawford while working as a research assistant in Mechanical Engineering on the project - “Compact Low-resolution Nuclear Magnetic Resonance (NMR)”, 2021 - 2023. Employed by Doty Scientific following graduation.

[4] Joud Satme; Aerospace Engineering, “UAV-deployable sensing network for rapid structural health monitoring”, 2021 - 2023, Enrolled at USC for a Ph.D.

[3] Emmanuel Ogunniyi; Mechanical Engineering, “Elastic Sensing Skin for Monitoring of Concrete Structures”, 2021 - 2023, Enrolled at USC for a Ph.D.

[2] Jason Smith; Mechanical Engineering, “Timing Deterministic Structural Model Updating Considering Impact and Fatigue Damage”, 2021 - 2023, Employed by NSWC-Carderock following graduation.

[1] Claire Drnek; M.S. Mechanical Engineering, “Local Eigenvalue Modification Procedure for Real-time Model Updating of Structures Experiencing High-rate Dynamic Events”, 2019 - 2020, Employed by IBM following graduation.

Graduated Master of Engineering (M.E.) with Significant Research Component

- Students with substantial research efforts who obtained a non-thesis Master and are typically funded.

[5] Zhymir Thompson; Computer Engineering (Dual advised with Jason Bakos in Computer Science), “Time Series Signal Processing for High-Rate Systems”, 2022 - 2025.

[4] Leighton Gay; Mechanical Engineering, “Distributed Control for Power Electronics”, 2022 - 2024.

[3] Nikita Goujevskii; Mechanical Engineering, “UAV Assisted Sensor Deployment for Infrastructure Monitoring Using Video Streaming”, 2023 - 2024.

[2] Claud J. Boyd; M.E. “Mechanical Engineering Thermal Modeling for Integrated Power Electric Ship Applications” 2021 - 2022.

[1] Shaheer Anjum; M.E. Mechanical Engineering, “Mechanical Engineering Real-time computational fluid dynamics for the automated landing of UAVs”, 2021 - 2022.

Current Undergraduate Students

- Only lists undergraduate students with substantial research who are typically funded.

[23] Hugo Luck; Aerospace Engineering, “Real-time Machine Learning for structure shock mitigation”, 2025 - present.

[22] Hakan Godoy; Benedict College - Engineering, “UAV Deployable Sensors onto Concrete”, 2025 - present.

[21] Mateo Garcia; Mechanical Engineering, 'Modular Covers for In situ Additive Manufacturing Monitoring", 2025 - present. Awarded: 2025 McNair Summer Fellowship $3,000.

[20] Charles Buren; Mechanical Engineering, "Development of an event-driven camera", 2025 - present. Awarded: 2025 McNair Summer Fellowship $3,000.

[19] Michelle Eigbe; Mechanical Engineering, "Modular Covers for In situ Additive Manufacturing Monitoring", 2024 - present.

[18] Nolan Shute; Aerospace Engineering, "Ground Cameras for Deployable Sensor Packages on UAVS", 2024 - present. Awarded: 2025 Magellan Apprentice for Capstone Program $1,500, Magellan Mini-Grant $1,000, 2025 McNair Summer Fellowship $3,000.

[17] Braden Ozenghar; Aerospace Engineering, "Wearable Health Tracker Development", 2024 - present.

[16] Patrick Wynne; Aerospace Engineering, "Wearable Health Tracker Development", 2024 - present. Awarded: 2025 Magellan Journey grant $1000, 2025 McNair Summer Fellowship $3,000.

[15] Josh Hager; Aerospace Engineering, "NMR System Development", 2024 - present, Awarded: McNair Summer Fellowship $3,000.

[14] Cebastione Bailey; Mechanical Engineering, "Battery Pack Design", 2024 - present.

[13] Amanda Sark; Aerospace Engineering, "Levee monitoring sensors with edge computing", 2024 - present. Awarded: 2025 McNair Summer Fellowship $3,000.

[12] Sydney Morris; Mechanical Engineering, "UAV-deployable Rain Gauge and levee monitoring sensors.", 2024 - present. Awarded: 2024 McNair Summer Fellowship $3,000.

[11] Ethan Ibarra; Mechanical Engineering, "UAV Sensor Package Delivery Systems.", 2024 - present. Awarded: 2024 McNair Summer Fellowship $3,000; Magellan Scholar Research Grant $2,500.

[10] Griffin Andrews; Mechanical Engineering, "UAV Sensor Package Delivery Systems.", 2024 - present.

[9] Mark Zheng; Mechanical Engineering, "Image-based Tracking of UAV Systems in Flight", 2024 - present. Awarded: 2024 McNair Summer Fellowship $3,000; Magellan Scholar Research Grant $2,500, 2025 McNair Summer Fellowship $3,000.

[8] Samuel Roberts; Aerospace Engineering, "In Situ Material Characterization and Tuning in Metal-based Additive Manufacturing.", 2024 - present. Awarded: 2024 McNair Summer Fellowship $3,000, Magellan Scholar $2,500.

[7] Matt Whetham; Mechanical Engineering, "In Situ Vibrometer Scanning of Laser Powder Bed Fusion.", 2024 - present. Awarded: 2024 McNair Summer Fellowship $3,000, 2025 McNair Summer Fellowship $3,000.

[6] Anson Huang; Mechanical Engineering, "Development of Compact Nuclear Magnetic Resonance Systems for Monitoring Environmental Contaminates", 2023 - present. Awarded Magellan Mini-Grant $500, 2025 McNair Summer Fellowship $3,000.

[5] Thienan Hoang; Midlands Tech, "In situ monitoring of additive manufacturing", 2023 - present. Awarded a NASA South Carolina Space Grant Consortium Technical College Research Award $4,000, 2025 McNair Summer Fellowship $3,000.

[4] Josh McGuire; Computer Engineering, "Embedded machine learning for wildfire fire detection", 2023 - present. Awarded: 2024 McNair Summer Fellowship $3,000, 2025 McNair Summer Fellowship $3,000.

[3] Angelo Varillas; Physics, "Quantum Sensing of Environmental Contaminates", 2023 - present.

[2] Matthew Burnett; Computer Engineering, "Design of experiments in laser power bed additive manufacturing", 2022 - present. Awarded: 2024 McNair Summer Fellowship $3,000, 2025 McNair Summer Fellowship $3,000.

[1] Winford Janvrin; Mechanical Engineering, "Development of Motionless Rain Gauge", 2022 - present. Awarded: Magellan Journey Scholar $1,000; 2023 McNair Summer Fellowship $3,000; Awarded Mike and Ann Sutton Fellowship $1,500.

Undergraduate Students Advised

[79] Jack George; Mechanical Engineering, "UAV-based Sensor Deployment", 2024 - 2025.

[78] Ryan Limbaugh; Mechanical Engineering, "Battery Degradation Modeling", 2023 - 2025.

[77] Josiah Worch; Aerospace Sensing, "Mechanical Sensing of Battery Deformation", 2023 - 2025.

[76] Korebami Adebajo; Mechanical Engineering, "In Situ Environmental Sensing", 2022 - 2025. Awarded: Magellan Journey Scholar $1,000; Magellan Apprentice Scholar $1,000; Magellan Scholar Research Grant $2,500; Mike and Ann Sutton Fellowship $850, Magellan Apprentice award for Capstone Scholars $1,000; Mike and Ann Sutton Fellowship $1,400.

[75] Parker Huggins; Electrical Engineering and Math, "Ship tracking using SAR and ML for NMR signal processing", 2021 - 2024. Awarded: Magellan Journey Scholar $1,000; 2022 McNair Summer Fellowship $2,500, Honors College Research Grant, $3,000.

[74] David Wamai; Computer Science, "Topological data analysis on field programmable gate array processors", 2022 - present; 2023 McNair Summer Fellowship \$3,000; Awarded: 2024 McNair Summer Fellowship \$3,000; NASA South Carolina Space Grant Consortium Undergraduate Student Research Award \$7,500.

[73] Parker Jackson; Midlands Tech, "Electric Drive-train Thermal System Design", 2023 - 2024.

[72] Connor Madden; Mechanical Engineering, "Electric vertical lift system testbed development", 2022 - 2024. Transitioned to a M.S. at the USC.

[71] Trotter Roberts; Mechanical Engineering, "Active control of hypersonic structures", 2022 - 2024. Transitioned to a M.S. at the USC.

[70] Nicholas Liger; Mechanical Engineering, "In situ monitoring of additive manufacturing processes", 2022 - 2024.

[69] Bariat Shuai; Benedict College - Engineering, "Embedded Topological Data Analysis - Hardware", 2023 - 2024.

[68] Nickola Simpson; Benedict College - Engineering, "Embedded Topological Data Analysis - Software", 2023 - 2024.

[67] Matthew Winkleblech ; Mechanical Engineering, "GPS tracking of UAV deployable sensors", 2024-2024.

[66] Nathan Shute; Electrical Engineering, “NMR System Design”, 2023 - 2024, Awarded: Magellan Journey Scholar $1,000.

[65] Mumin Adhami; Mechanical Engineering, “Discrete Element Method (DEM) modeling particle dampers”, 2023 - 2024. Transitioned to a M.S. at USC.

[64] Ty Dangerfield; Mechanical Engineering, “Wireless Geophone Sensor Development”, 2023-2024. Transitioned to a M.S. at USC.

[63] Daniel “Nile” Coble; Mechanical Engineering and Math, “Embedded Machine Learning”, Awarded a Magellan Scholar, $3,000; NSF REU summer 2022 at Lehigh University, Honors College Research Grant, $3,000; 2023 McNair Summer Fellowship $3,000; Awarded Mike and Ann Sutton Fellowship $1,500. 2021 - 2024. Awarded NSF GRFP and attend Duke University for a Ph.D.

[62] Jacob Vaught; Mechanical Engineering, Electrical Engineering, Computer Engineering, “FPGA-based signal processing on embedded systems”; Awarded Mike and Ann Sutton Fellowship $1,500, 2022 - 2024.

[61] Antonio Fonce; Computer Engineering, “Real-time control of high-speed structures”, 2022 - 2024.

[60] Jackie Wang; Computer Engineering, “Machine Learning on field programmable gate array processors”, 2022 - 2024. Awarded: Magellan Journey Scholar $1,000; 2023 McNair Summer Fellowship $3,000.

[59] Sidd Malik; Mechanical Engineering, “Magnetic Particle Separator.”, 2024 - 2024.

[58] Brandon Rogers; Mechanical Engineering, “FEA model updating of walking bridge”, 2023 - 2024.

[57] Devon Goshorn; Computer Engineering, “Automated testing of PCBs under shock”, 2023 - 2024.

[56] Joseph Johnson; Electrical Engineering, “UAV-deployed soil sensor”, 2022 - 2024. Awarded Mike and Ann Sutton Fellowship $3,000

[55] John White; Mechanical Engineering, “Signal Conditioning Electronics for Low-cost Nuclear Magnetic Resonance”, 2021 - 2024. Awarded: Magellan Scholar, $3,000.

[54] Luke Jannazzo; Computer Engineering, “Hardware/software design for automatons UAV flight”, 2023 - 2024.

[53] Gabriel Morris; Electrical Engineering, “UAV Deployable Sensor Packages and Cameras for Flood Monitoring”, 2023 - 2024.

[52] Sai Durga Rithvik Oruganti; Computer Science, “Wireless communication for UAV Deployed Sensor Packages”, 2023.

[51] Ryan Van Wyk; Chemical Engineering, “Wireless communication for UAV Deployed Sensor Packages”, 2023.

[50] Nick Corbin; Civil Engineering, “In situ monitoring of water quality parameters”, 2022 - 2023.

[49] Christopher Heaps; Mechanical Engineering, “Development of Motionless Rain Gauge”, 2022 - 2023. Awarded: Magellan Journey Scholar $1,000; 2023 McNair Summer Fellowship $3,000.

[48] Mukeh Foh; Massachusetts Institute of Technology, Mechanical Engineering, "Autonomous Sensing Systems", Summer 2023.

[47] Ryan Yount; Mechanical Engineering, "Development of sensor network of vibration sensors", 2022 - 2023. Awarded 2022 McNair Summer Fellowship $2,500.

[46] Corinne Smith; Mechanical Engineering, "UAV Deployed sensors for hydrologic parameter sensing", 2020 - present. Awarded: Magellan Scholar, $3,000; 2022 McNair Summer Fellowship $2,500; Mike and Ann Sutton Fellowship $1500; Magellan Voyager program (travel grant) $500; Honors College Research Grant Award $1,500; AIAA Guidance, Navigation, and Control Technical Committee - Undergraduate Conference Experience $600 travel + conference registration. Awarded NSF GRFP and attend Carnegie Mellon University for a Ph.D.

[45] Ryan Brown; Mechanical Engineering, "Development of Motionless Rain Gauge", 2022 - 2023.

[44] Miles Wedeking; Computer Info Systems, "Signal processing on embedded systems", 2022.

[43] Connor Nee; Mechanical Engineering, "Multiphysics modeling of electric vertical lift systems", 2022.

[42] Alex Toth; Mechanical Engineering, "Real-time thermal control for power inverters", 2022 - 2023. Awarded 2022 McNair Summer Fellowship $2,500.

[41] Akil Dyson; Benedict College - Engineering, "High-rate impact testing", 2022 - 2022. 39

[40] Quintin Hughes; Mechanical Engineering, "In Situ monitoring of magnetic particles in aquatic conditions", 2022 - 2022.

[39] Zachary Ziehl; Information Technology, "Real-time decision making for structures experiencing shock", 2022 - 2022. Awarded 2022 McNair Summer Fellowship $2,500.

[38] Chris Nelson; Mechanical Engineering, "Sensing Skins for Structural Health Monitoring", 2022 - 2022.

[37] Ben Brown; Mechanical Engineering, "Development of sensor network of water height sensors", 2022 - 2022.

[36] Malichi Flemming; Mechanical Engineering, "In Situ Monitoring of Additive Manufacturing", 2021 - 2022.

[35] Ethan "Lake" Williams; Mechanical Engineering, "Modeling of NMR spectroscopy", Awarded a Science Undergraduate Research Fellowship (SURF) and Magellan Mini-Grant, $3,000, 2020 - 2022.

[34] Leighton Gay; Mechanical Engineering, "Active Control of Structures Using Piezoelectrics", 2021 - 2022. Transitioned to a M.S. at the USC.

[33] Christian Stone; Mechanical Engineering, "Mechanical systems for Low-cost Nuclear Magnetic Resonance", 2021 - 2022.

[32] Richard Hailey; Mechanical Engineering, "Active Thermal Control of Electric Power Systems", 2021 - 2022. Transitioned to a M.S. at the USC.

[31] Braden Priddy; Mechanical Engineering, "Long short-term memory for time series predictions", 2020 - 2022. Transitioned to a M.S. at the USC.

[30] Shekinah Sanders; Mechanical Engineering, "UAV-deployable rain gauge", 2022 - 2022.

[29] Ayush Bajaj; Mechanical Engineering, "Low-power Plasma generator", 2022 - 2022.

[28] Sebastian Ionita; Electrical Engineering, "Design of a custom polymer 3D printer for in-situ component qualification", awarded a 2020 McNAIR Junior Fellowship for undergraduate research. 2019 - 2022.

[27] Kyle Ng; Mechanical Engineering, "UAV-deployable water quality sensor", 2021 - 2022.

[26] Hung-Tien Huang; Computer Science, "Sound-based wildfire detection", awarded a 2020 McNAIR Junior Fellowship for undergraduate research, 2019 - 2022.

[25] Daniel Gibson; Mechanical Engineering, "Development of UAV controls within the ceiling effect domain", awarded a 2021 McNair Junior Fellowship for undergraduate research, $2,000, 2020 - 2021.

[24] Ava Philbeck; Mechanical Engineering, "Development of Motionless Rain Gauge", 2021.

[23] Saif Wilkes-Davis; Mechanical Engineering, "Development of motionless rain gauge", awarded a 2021 McNAIR Junior Fellowship for undergraduate research, $2,000, 2020-2021.

[22] Jacob Womick; Mechanical Engineering, Awarded a Magellan Scholarship for, "Distributed energy solutions for actively cooled batteries", $3,000. Co-advised with Dr. Jamil Khan, 2020-2021.

[21] Jacob Martin; Electrical Engineering, "Compact nuclear magnetic resonance (NMR)", 2020 - 2021. Transitioned to a M.S. at the USC.

[20] Jarrett Peskar; Mechanical Engineering, "Development of a battery simulator on embedded hardware", 2020 - 2021. Transitioned to a Ph.D. at the USC.

[19] William Bowers; Mechanical Engineering, "Large Area Sensing Skins for Crack Detection", 2020 - 2021.

[18] Breanna Spruell; Mechanical Engineering, "Electrical Impedance Tomography for Smart Structures", awarded an NSF-REU $8,000, 2020 - 2021.

[17] Sydney Houck; Mechanical Engineering, "UAV Deployed sensors for environmental parameter sensing", 2020 - 2021.

[16] Richard Matthews; Mechanical Engineering, "UAV Deployed sensors for hydrologic parameter sensing", 2020 - 2021.

[15] Nicholas Peraino; Mechanical Engineering Awarded a Magellan Scholarship for, "Identification of objects with passively sensing artificial seaweed", $2,750 2019 - 2021.

[14] Ishrat Singh; Computer Science Awarded: Science Undergraduate Research Fellowship (SURF) for, "Real-time machine learning of vibration signals", $3,000, Magellan Scholarship, $2,500, and; NSF-REU $8,000, 2019 - 2021.

[13] Jason Smith; Mechanical Engineering Awarded a Magellan Scholarship and NSF-REU for, "Real-Time Estimation of Structural System State using Long Short-Term Memory Neural Networks", $2,750 2019 - 2021. Transitioned to a M.S. at the USC.

[12] Sirazus "Hasib" Salekin; Electrical Engineering, "Electrical Impedance Tomography for Smart Structures", awarded an NSF-REU $8,000, 2019 - 2021.

[11] Joud Satme; Electrical Engineering Awarded a Magellan Scholarship for, "Drone development for structural health monitoring", $2,750 2019 - 2021. Transitioned to a Ph.D. at the USC.

[10] Zhymir Thompson; Computer Science, "Generative adversarial network for data synthesis", 2020 - 2021. Transitioned to a Ph.D. at the USC.

[9] John Cooley; Mechanical Engineering, "Digital twins for navy electric ship applications", 2020 - 2020. Transitioned to a M.S. at the USC.

[8] Michael Gallagher; Mechanical Engineering Awarded a Science Undergraduate Research Fellowship (SURF) for, "Miniaturization of Data Acquisition Systems for Structural Health Monitoring", $1,560 2019 - 2020.

[7] Michael Carroll; Mechanical Engineering, "Real-Time State Estimation of Structural Systems for the United State Air Force", 2019 - 2020.

[6] Mitchell Stiles; Mechanical Engineering, "Development of CAD models for advanced friction dampers", 2019 - 2020.

[5] David H. Thompson; Mechanical Engineering, "National Instruments Data Acquisition + Python Programming Language: A cheaper alternative to LabVIEW", 2019.

[4] Matthew Cover; Mechanical Engineering, "Design and manufacturing of a dielectric tester", 2018 - 2019.

[3] Alex Vereen; Mechanical Engineering, "Testing of Additively Manufactured Friction Material", 2018 - 2020. Transitioned to a Ph.D. at the USC.

[2] Claire Drnek; Mechanical Engineering Awarded a Magellan Scholarship for, "Gait Analysis and Person Identification Using Human-Structure Interaction", $2,500 2018 - 2019. Transitioned to a M.S. at the USC.

[1] Bianca Riello; Biomedical Engineering Awarded a Science Undergraduate Research Fellowship (SURF) for, "Methodologies for integrated control and data acquisition of a structural test bed", $1,250 2018 - 2019.

High School Students Supervised

[25] Bose Kaikini, "TDA for Shock and Vibration", June - August 2025.

[24] Kyle Pacheco, "In situ monitoring of powder bed fusion additive manufacturing", June - August 2025.

[23] Delbert Siuhi, "3D printing profiles for wings", June - August 2025.

[22] Miriam Morales, "SMR thermal loop modeling", June - August 2025.

[21] Logan Pacheco, "In situ Water Quality Sensor Deployment", June - August 2025.

[20] Jackie Yang, "In situ Water Quality Sensor Development", June - August 2025.

[19] Hampton DuBose, "SMR thermal loop development", June - August 2025.

[18] Dao Bui, "Cyber Security for edge computing devices", June - August 2025.

[17] Evan Phillips, "YOLO on embedded systems", May - August 2025.

[16] Aditya Anandkumar, "Development of a fixed-wing UAV", May - August 2025.

[15] Micah Doberne-Schor, "Development of a fixed-wing UAV", May - August 2025.

[14] Jackson Heaberlin, "Power system management for field deployable NMR", July 2024.

[13] Aaron Fonce, "Pump controller for NMR", June - July 2024.

[12] Samuel Tadamatla "Power supply for in situ water quality monitoring", June - July 2024.

[11] Maxell Corwin, “Simscape modeling for physics-informed machine learning”, June - July 2024.

[10] Gabariel Barahona, “UAV deployable water quality sensor”, June - July 2024.

[9] Braeden Montory, “Flow through NMR system development”, June - July 2024.

[8] Emma Zurine, “GPS tracking of sensor locations”, June - July 2024.

[7] Chanthoney Um, “In Situ monitoring of metal 3D printing”, June - July 2024.

[6] Ali Wallama, “GPS tracking of sensor locations”, June - July 2024.

[5] Sam Cancilla, “Active structural control”, June - July 2023.

[4] Aaron Fonce, “Pump controller for NMR”, June - July 2023.

[3] Jaden Coffey, “Online thermal tracking for batteries”, June - July 2023.

[2] Adelaide Rogers, “Dynamic Element Modeling”, June - July 2023.

[1] Christopher Heaps, “Rain Gauge Development”, May - July 2019.

Research Professorships, Postdoctoral Scholars, and Research Staff

Research Professorships

[1] Yanzhou Fu; Research Assistant Professor, January 2025 - present.

Research Staff

[3] David Wamai; Research Assistant, January 2025 - present.

[2] Malichi Flemming; Research Assistant, May 2022 - present.

[1] Yanzhou Fu; Research Assistant, March 2024 - December 2024.

Mentorship Experiences at Iowa State University as a Ph.D. Student

Graduate students

[3] Jin Yan Ph.D. Civil Engineering, “Surrogate Model Updating for Mesoscale Structures Using a Dense Sensor Network”, 2017 - 2018.

[2] Yuesheng Li M.S. Civil Engineering, “Smart resistive membrane sensors for structural health monitoring”, 2014 - 2016.

[1] Irvin Pinto M.S. Civil Engineering, “Acceleration of Percolation for Cementitious Sensors using Conductive Paint Filler”, 2014 - 2016.

Undergraduate Students

[21] Ayuush Mehta Civil Eng., Stress estimations with embedded systems 2018 - 2018.

[20] Connor Theisen Industrial Eng., Structural control and damping 2014 - 2018.

[19] Heather Murphy Mechanical Eng., Structural control and damping 2014 - 2018.

[18] Nicholas Anastasi Mechanical Eng., Structural control and damping 2014 - 2018.

[17] Sammy Hassan Civil Eng., Corrosion detection and measurement 2017 - 2018.

[16] Khuzema Wala Civil Eng., Sensor manufacturing and testing 2017 - 2017.

[15] Shuang “Jack” Li Civil Eng., Sensor interface development 2017 - 2017.

[14] Cidney Hartz Civil Eng., NSF-REU project on dense sensor networks 2017 - 2017.

[13] Xun Zhou Civil Eng., Dynamic testing of large area sensors 2016 - 2017.

[12] Justin Whorley Electrical Eng., Cable investigation for sensor networks 2017 - 2017.

[11] Akira Demoss Electrical Eng., Material testing and embedded systems 2015 - 2017.

[10] Jordan Schlak Aerospace Eng., Sensor testing in wind tunnel 2015 - 2016.

[9] Quiqi Cai Civil Eng., Fatigue crack detection using capacitive sensors 2016 - 2016.

[8] Anzhe Wang Civil Eng., Dynamic testing of large area sensors 2016 - 2016.

[7] Avery Zaleski Civil Eng., NSF-REU noise study of sensor networks 2016 - 2016.

[6] Dan Arbogast Civil Eng., Project on dense sensor networks 2015 - 2015.

[5] Brooke Mitchell Civil Eng., Project on dense sensor networks 2015 - 2015.

[4] Garrett Bird Civil Eng., NSF-REU project on dense sensor networks 2015 - 2015.

[3] Paola Armada-Rodriguez Civil Eng., NSF-REU sensor fabrication 2015 - 2015.

[2] Danial Soto Civil Eng., Dispersion of carbon black in concrete 2015 - 2015.

[1] Enrique Delgado Civil Eng., Dispersion of carbon black in concrete 2015 - 2015.

Student-led Research Grants

Student-led research grants and projects where Austin Downey served as the mentor.

[73] Mateo Garcia, McNAIR Junior Fellowship, advised by Yanzhou Fu; co-advised by Austin Downey, Modular Covers for In situ Additive Manufacturing Monitoring, $3,000, 2025

[72] Charles Buren, McNAIR Junior Fellowship, advised by Yanzhou Fu; co-advised by Austin Downey, Development of an Event-Driven Camera, $3,000, 2025

[71] Matthew Burnett, McNAIR Junior Fellowship, advised by Sang Hee Won; co-advised by Austin Downey, NMR Data Processing for In situ Water Quality Data, $3,000, 2025

[70] Matthew Whetham, McNAIR Junior Fellowship, advised and co-advised by Austin Downey, Development of an SMR Emulator, $3,000, 2025

[69] Amanda Sark, McNAIR Junior Fellowship, advised by Jasim Imran; co-advised by Austin Downey, UAV Deployed Sensor Packages to Concrete, $3,000, 2025

[68] Patrick Wynne, McNAIR Junior Fellowship, advised by Bridget Armstrong; co-advised by Austin Downey, Development of a Personal Health Tracker, $3,000, 2025

[67] Qi Zheng, McNAIR Junior Fellowship, advised by Jasim Imran; co-advised by Austin Downey, Stereo Vision–Based UAV Tracking, $3,000, 2025

[66] Joshua McGuire, McNAIR Junior Fellowship, advised by Jason Bakos; co-advised by Austin Downey, FPGA Development for Field-Deployable NMR Systems, $3,000, 2025

[65] Nolan Shute, McNAIR Junior Fellowship, advised by Jasim Imran; co-advised by Austin Downey, UAV Deployed Camera Systems, $3,000, 2025

[64] Joshua Hager, McNAIR Junior Fellowship, advised and co-advised by Austin Downey, Flow-Through Water Quality System, $3,000, 2025

[63] Thienan Hoang, McNAIR Junior Fellowship, advised by Yanzhou Fu; co-advised by Austin Downey, Modular Covers for In situ Additive Manufacturing Monitoring, $3,000, 2025

[62] Nolan Shute, Magellan Mini-Grant, Ground Cameras for Deployable Sensor packages on UAVS, $1,000, 2025

[61] Nolan Shute, Magellan Apprentice for Capstone Program, Ground Cameras for Deployable Sensor packages on UAVS, $1,500, 2025

[60] Andrew Griffin, Magellan Scholar Research Grant, Unmanned Ariel Vehicle Retrieval of Surface Buoy Networks for Continuous Water Quality Monitoring, $2,500, 2025

[59] Ethan Ibarra, Magellan Scholar Research Grant, Magellan-Ibarra-Design and Analysis of a UAV Deployment System for Vibration-Based Structural Health Monitoring Applications, $2,500, 2025

[58] Thienan Hoang, NASA South Carolina Space Grant Consortium, Real-Time In-Situ Ultrasonic and Multi-Modal Monitoring for Quality Control in Laser Powder Bed Fusion Additive Manufacturing, $4,000, 2024

[57] Qi Zheng, South Carolina Honors College Research, UAV tracking with cameras, $3,000, 2024

[56] Patrick Wynne, Magellan Journey, Wearable Health Tracker Development, $1,000, 2024

[55] Anson Huang, Magellan Mini-Grant grant, Non-linear vibration signal compensation technique for UAV-deployable structural health monitoring sensor packages $500, 2024

[54] Samuel Roberts, Magellan Scholar Research Grant, Using the Discrete Element Method to Model Particle Density in Laser Powder Bed Fusion Dampers $2,500, 2024

[53] Sydney Morris, Mike and Ann Sutton Fellowship, UAV-deployed sensing spikes $1,700, 2024

[52] Korebami Adebajo, Mike and Ann Sutton Fellowship, Electric Aircraft Routing $850, 2024

[51] Trotter Roberts, Mike and Ann Sutton Fellowship, Active structural control $850, 2024

[50] Connor Madden, Magellan Scholar Research Grant, Bayesian model updating for battery CID failure $2,500, 2024

[49] Korebami Adebajo, Magellan Scholar Research Grant, Multi-domain Modeling of an Electric Airplane $2,500, 2024

[48] Nicholas Liger, Magellan Scholar Research Grant, Wifi-Enabled, Low-Cost, Water Level Monitoring Sensor Package for Reservoirs and Dams $2,500, 2024

[47] Qi Zheng, South Carolina Honors College Research, Strain testing with camera-based recognition $3,000, 2024

[46] Nathan Shute, Magellan Journey Grant, NMR System Design $1,000, 2024

[45] Korebami Adebajo, Magellan Scholar Research Grant, Multi-domain Modeling Of An Electric Airplane $1,000, 2023

[44] Jackie Wang, Magellan Scholar Research Grant, Advanced Sine Wave Generation and Analysis for Particle Concentration Measurement and Fuel Classification $2,500, 2023

[43] Winford Janvrin, Magellan Scholar Research Grant, Compact NMR, $2,500, 20203

[42] David Wamai, NASA South Carolina Space Grant Consortium Undergraduate Student Research Award, $7,500, 2023

[41] Korebami Adebajo, Michael and Ann Sutton Fellowship, Active structural control, $1,400, 2023

[40] Trotter Roberts, Michael and Ann Sutton Fellowship, Electric Aircraft Routing, $1,400, 2023

[39] Jacob Vaught, Michael and Ann Sutton Fellowship, FPGA -base data acquisition and control, $1,500, 2023

[38] Winford Janvrin, Michael and Ann Sutton Fellowship, NMR sensor development, $2,000, 2023

[37] Matthew Burnett, Michael and Ann Sutton Fellowship, Is situ water quality sensing, $1,500, 2023

[36] Daniel Coble, Michael and Ann Sutton Fellowship, Physics informed ML, $1,500, 2023

[35] John White, Magellan Scholar Research Grant, Soft Elastomeric Capacitor for Shear Monitoring Across Steel Joints, $3,000, 2023

[34] Parker Huggins, Honors College Research Grant, NMR, $3,000, 2023

[33] Daniel Coble, Honors College Research Grant, RTML funding, $3,000, 2023

[32] Jackie Wang, Magellan Journey Scholar, NMR: Advanced Sine Wave Generation and Analysis for Particle Concentration Measurement and Fuel Classification, $1,000, 2023

[31] Korebami Adebajo, Magellan Apprentice award, Simulink modeling of an electric airplane, $1,000, 2023

[30] Winford Janvrin, Magellan Apprentice grant, Flow Through Water Quality System, $1,000, 2023

[29] Corinne Smith, AIAA Guidance, Navigation, and Control Technical Committee - Undergraduate Conference Experience, Travel award for AIAA SciTech, $850, 2022

[28] Corinne Smith, Honors College Research Grant Award, UAV sensor package development , $1,500, 2022

[27] Corinne Smith, Magellan Voyager program, Travel to IEEE Sensors, $500, 2022

[26] Christopher Heaps, Magellan Journey award, Development of a UAV-deployable rain gauge, $1,000, 2022

[25] Korebami Adebajo, Magellan Journey award, Thermo-mechanical-electrical digital twin of an electric vertical lift craft, $1,000, 2022

[24] Winford Janvrin, Magellan Journey award, Flow-through environmental system, $1,000, 2022

[23] Parker Huggins, Magellan Journey award, FPGA implementation of SAR data processing , $1,000, 2022

[22] Zachary Ziehl, McNAIR Junior Fellowship for undergraduate research, real-time decision making for high-rate dynamics, $2,500, 2022

[21] Parker Huggins, McNAIR Junior Fellowship for undergraduate research, SAR processing in real-time, $2,500, 2022

[20] Corinne Smith, McNAIR Junior Fellowship for undergraduate research, Water sensor, $2,500, 2022

[19] Ryan Yount, McNAIR Junior Fellowship for undergraduate research, UAV network of vibration sensors, $2,500, 2022

[18] Joseph Johnson, Michael and Ann Sutton Fellowship, Active Vibration Control in Hypersonic Vehicles through Piezoelectric Devices, $1,500, 2022

[17] Corinne Smith, Michael and Ann Sutton Fellowship, Wireless sensor network for tracking flash floods, $1,500, 2022

[16] Hung-Tien Huang, McNAIR Junior Fellowship for undergraduate research, Sound-based wildfire detection, $2,000, 2021

[15] Sebastian Ionita, McNAIR Junior Fellowship for undergraduate research, Design of a custom polymer 3D printer for in-situ component qualification, $2,000, 2021

[14] Daniel Gibson, McNAIR Junior Fellowship for undergraduate research, Development of UAV controls within the ceiling effect domain, $2,000, 2021

[13] Corrine Smith, Magellan Scholar , A network of UAV deployable sensor packages for monitoring hydraulic parameters during severe weather events, $3,000, 2021

[12] Daniel Coble, Magellan Scholar , High-rate Machine Learning for Structural State Estimation, $3,000, 2021

[11] Ethan Williams, Magellan Mini-Grant, Benchtop Nuclear Magnetic Resonance (NMR), $1,000, 2021

[10] Ethan Williams, Honors College Research Grant , Nuclear Magnetic Resonance (NMR), $2,000, 2021

[9] Joud Satme, Magellan Scholar , Drone development for structural health monitoring, $2,750, 2020

[8] Nicholas Peraino, Magellan Scholar , Identification of objects with passively sensing artificial seaweed, $2,750, 2020

[7] Jacob Womick, Magellan Scholar , Analysis of Battery Health During Rapid Energy Transfer within a Battery Network, $3,000, 2020

[6] Saif Wilkes-Davis, McNAIR Junior Fellowship for undergraduate research, Motionless rain gauge, $2,000, 2020

[5] Ishrat Singh, Magellan Scholar , Low latency Nonlinear Time Series Analysis and Prediction Using Multilayer Perceptrons, $2,750, 2019

[4] Ishrat Singh, Honors College Research Grant , Real-time machine learning of vibration signals, $3,000, 2019

[3] Claire Drnek, Magellan Scholar , Gait Analysis and Person Identification Using Human-Structure Interaction, $2,500, 2019

[2] Michael Gallagher, Honors College Research Grant , Real-Time State Estimation of Structural Systems for the United State Air Force, $1,560, 2019

[1] Bianca Riello, Honors College Research Grant , Methodologies for integrated control and data acquisition of a structural test bed, $1,250, 2018

Courses Taught

Lecture

[15] **EMCH-561 Engineering Problem Solving with Machine Learning**, Summer 2024, 13 students.

[14] **EMCH-330 Mechanical Vibrations**, Spring 2024, 33 students.

[13] **EMCH-368 Mechatronics**, Fall 2023, 55 students.

[12] **EMCH-561 and ELCT 531-Digital Control Systems**, (meet-together) Spring 2023, 44 students.

[11] **EMCH-330 Mechanical Vibrations**, Spring 2023, 33 students.

[10] **EMCH-561 Machine Learning for Mechanical Engineers**, Fall 2022, 41 students.

[9] **EMCH-368 Mechatronics**, Spring 2022, 92 students.

[8] **EMCH-330 Mechanical Vibrations**, Spring 2022, 34 students.

[7] **EMCH-516 Control Theory in Mechanical Engineering**, Fall 2021, 19 students.

[6] **EMCH-561 Machine Learning for Mechanical Engineers**, Summer 2021, 27 students.

[5] **EMCH-330 Mechanical Vibrations**, Spring 2021, 24 students.

[4] **EMCH-368 Mechatronics**, Fall 2020, 152 students.

[3] **EMCH-561 Machine Learning for Mechanical Engineers**, Spring 2020, 34 students.

[2] **EMCH-330 Mechanical Vibrations**, Fall 2019, 130 students.

[1] **EMCH-330 Mechanical Vibrations**, Fall 2018, 78 students.

Asynchronous

[2] **EMCH-792 Multi Physics Systems Modeling**, Fall 2024, 2 student.

[1] **EMCH-561 Structural Dynamics**, Summer 2023, 1 student.

Independent Study

[10] **EMCH-460 Special Problems**, Spring 2025, 1 student.

[9] **EMCH-460 Special Problems**, Fall 2024, 3 students.

[8] **EMCH-460 Special Problems**, Spring 2024, 2 students.

[7] **EMCH-460 Special Problems**, Fall 2023, 3 students.

[6] **EMCH-460 Special Problems**, Spring 2022, 7 students.

[5] **EMCH-460 Special Problems**, Fall 2021, 1 student.

[4] **EMCH-460 Special Problems**, Spring 2021, 4 students.

[3] **EMCH-460 Special Problems**, Spring 2020, 2 students.

[2] **EMCH-460 Special Problems**, Fall 2019, 2 students.

[1] **EMCH-460 Special Problems**, Spring 2019, 2 students.

Select Services

Professional Organizations

[5] Institute of Electrical and Electronics Engineers (IEEE), Member, 2022 - present.

[4] Society for Experiment Mechanics (SEM), Member, 2020 - present. Data Science Technical Division leadership committee (various roles), 2020 - present.

[3] Society of Photo-Optical Instrumentation Engineers (SPIE), Member, 2019 - present.

[2] American Society of Mechanical Engineers (ASME) Member 2019 - present. Adaptive Structures & Material Systems (ASMS) Branch, Member, 2019 - present.

[1] American Society of Civil Engineers (ASCE), Member, 2017 - present.

Conferences Organized/Chaired

[2] 2024 Battery Safety Workshop; University of South Carolina, Columbia South Carolina, August 5^{th}-6^{th}, 2024

[1] 2023 Battery Safety Workshop; University of North Carolina at Charlotte, Charlotte, North Carolina, June 8^{th}-9^{th}, 2023

Conference Special Sessions Organized and Chaired

[4] SEM IMAC XLII (2025); 02 Advanced Techniques for Realtime Monitoring and Predictive Analysis in Dynamic Systems

[4] SEM IMAC XLII (2024); 072 Physics Informed Machine Learning

[3] SEM IMAC XLI (2023); 066 High-Rate Structural Health Monitoring and Prognostics

[2] SEM IMAC XXIX (2021); 058 Panel Discussion for High-Rate Structural Health Monitoring and Prognostics

[1] SEM IMAC XXIX (2021); 030 High-Rate Structural Health Monitoring and Prognostics

Conference Sessions Chaired

[11] SPIE Smart Structures + Nondestructive Evaluation 2025; Active and Passive Smart Structures and Integrated Systems XIX; Passive and Active Vibration Isolation Systems

[10] SPIE Smart Structures + Nondestructive Evaluation 2025; Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2025; Innovative Sensor Materials I

[9] Battery Safety Workshop (2024); Battery failure behaviors and mechanisms

[8] AIAA SciTech (2024); Multifunctional Structures/Materials & Structural Health Monitoring and Prognosis

[7] SEM IMAC XLI (2023); 059 Transfer Learning and Population-based SHM

[6] SPIE Smart Structures + NDE 2022; Smart sensor networks for civil infrastructure monitoring

[5] SEM IMAC XL (2022); 067 Deep Learning for Dynamic Condition Monitoring

[4] ASME QNDE 2021; 16-02: Structural Health Monitoring

[3] ASME QNDE 2021; 08-02: NDE for Additive Manufacturing

[2] SEM IMAC XXIX (2021); 006 Data-based Modeling and Analysis

[1] SPIE Smart Structures + Nondestructive Evaluation 2019; SESSION 13B: Skin-based Distributed Sensing for SHM Applications

Best Paper Awards Organized

[6] SEM-IMAC Data Science Technical Division best paper 2024 Co-organized best paper award panel for the SEM-IMAC Data Science Technical Division best paper competition

[5] SEM-IMAC Data Science Technical Division best paper 2023 Organized best paper award panel for the SEM-IMAC Data Science Technical Division best paper competition

[4] SEM-IMAC Data Science Technical Division best paper 2022 Organized best paper award panel for the SEM-IMAC Data Science Technical Division best paper competition

[3] ASME-ASMS Materials and Systems best paper 2021 Organized best paper award panel for the ASME-ASMS branch's Structures and Structural Dynamics best paper competition

[2] SEM-IMAC Data Science Technical Division best paper 2021 Organized best paper award panel for the SEM-IMAC Data Science Technical Division best paper competition

[1] ASME-ASMS Materials and Systems best paper 2019 Organized best paper award panel for the ASME-ASMS branch's Materials and Systems best paper competition

Special Journal Issues

[1] "Flexible Sensors for Structural Health Monitoring" in MDPI Sensors. 2022.

Seminars Organized at the University of South Carolina

[10] John Christian from George Tech, March 3, 2025

[9] Fatemeh Afghah from Clemson University May 29, 2024

[8] Arion Pons from Chalmers University of Technology April 18, 2024

[7] Jie Zhang from University of Texas at Dallas January 23, 2024

[6] Jihong Ma from the University of Vermont, November 9, 2023

[5] John Christian from George Tech, November 18, 2022

[4] Donghyeon Ryu from New Mexico Tech, April 23, 2022

[3] Daniel Kiracofe from The University of Cincinnati, April 14, 2022

[2] Marcus Perry from Strathclyde University, November 19, 2020

[1] James Ricles from Lehigh University February, 12, 2020

Academic Reviewer (select and current)

Journal name	Publisher
Engineering structures	Elsevier
Mechanical Systems and Signal Processing	Elsevier
Sensors	MDPI
Journal of Intelligent Material Systems and Structures	Springer
Applied Sciences	MDPI
SMASIS Conferences	ASME
Structural and Multidisciplinary Optimization	Springer
Smart Materials and Structures	IOP
Structural Health Monitoring	Sage
Measurement	Elsevier
Journal of Vibration and Control	Sage
Additive Manufacturing	Elsevier
Civil Structural Health Monitoring	Springer
Measurement Science and Technology	IOP
Earthquake Engineering and Structural Dynamics	Wiley
Advances In Structural Engineering	Sage
Automation in Construction	Elsevier
Journal of Nondestructive Eval., Diag. and Prog. of Engineering Systems	ASME

Last updated on September 1, 2025