

Austin R.J. Downey

Curriculum Vitae

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Professional Academic Experience

- 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 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".
- 2009 - 2014 **B.S.**, Civil Engineering, Iowa State University, Ames, Iowa.
- 2006 - 2007 **T.C.**, Industrial Mechanics, Iowa Central Community College, Fort Dodge, Iowa.

Curriculum Vitae Statistics

- Publications Over 1500 citations, h-index 24, i10-index 34, over 100 publications.
- Students 7 current Ph.D and 7 current M.S; 1 graduated Ph.D. 5 graduated M.S.
- Students Actively mentored over 60 Undergraduate students in significant research actives.
- Funding Over \$33.4M in total funding (\$4.1M my portion) with \$2.7M as project PI.
- Funding Over \$70,000 in undergraduate led research across 27 awards.

Licensure

- 2014 **Engineer Intern**, #19091, State of Iowa.

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

- [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**, 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**, 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** Online low-latency machine learning that considers both training and inference. To enable real-time performance this research focuses on the co-design of algorithms and heterogeneous computing hardware. These methodologies have various applications in real-time state estimation, time-series forecasting, and anomaly detection.
- Real-time Decision-making** Real-time decision-making and control for structures operating in extreme dynamic environments. Physics-informed decisions are empowered by physics-based models that are updated in real-time. Applications include hypersonic vehicles, active blast mitigation, and orbital infrastructure.
- Smart and Adaptive Structures** Smart and adaptive structures that leverage novel sensors and structural control devices that enable a structure to learn from its environment and respond in real-time. Specific avenues of investigation include sensing skins, semi-active dampers, and active structural elements. Applications include civil infrastructure, transportation systems, and hypersonic vehicles.
- Additive Manufacturing** In situ monitoring and online validation of additively manufactured components using a variety of sensing systems. Active measurement control (spatial and temporal) enables the real-time assimilation of measurement data into physics-informed models. Applications include fused-filament fabrication (FFF), laser-based additive manufacturing (LBAF), and wire-arc additive manufacturing (WAAM).

Visiting Scholarship

- 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

- [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

- [50] Alexander Vereen, Austin R.J. Downey, Subramani Sockalingam, and Simon Laflamme. Validation of large area capacitive sensors for impact damage assessment. *Measurement Science and Technology*, 2024
- [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. mar 2023. doi:10.22541/essoar.167839985.51092905/v1
- [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, 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.ymsp.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.ymsp.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.ymsp.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, and Filippo Ubertini. Concrete crack detection and monitoring using a capacitive dense sensor array. *Sensors*, 19(8):1843, apr 2019. doi:10.1016/j.engstruct.2019.03.032
- [22] Austin Downey, Connor Theisen, Heather Murphy, Nicholas Anastasi, and Simon Laflamme. Cam-based passive variable friction device for structural control. *Engineering Structures*, 188:430–439, jun 2019. doi:10.1016/j.engstruct.2019.03.032
- [21] Austin R. J. Downey, Jin Yan, Eric M. Zellner, Karl H. Kraus, Iris V. Rivero, and Simon Laflamme. Use of flexible sensor to characterize biomechanics of canine skin. *BMC Veterinary Research*, 15(1):40, jan 2019. doi:10.1186/s12917-018-1755-y
- [20] Austin Downey, Yu-Hui Lui, Chao Hu, Simon Laflamme, and Shan Hu. Physics-based prognostics of lithium-ion battery using non-linear least squares with dynamic bounds. *Reliability Engineering & System Safety*, 182:1–12, feb 2019. doi:10.1016/j.ress.2018.09.018
- [19] Austin Downey, Mohammadkazem Sadoughi, Simon Laflamme, and Chao Hu. Incipient damage detection for large area structures monitored with a network of soft elastomeric capacitors using relative entropy. *IEEE Sensors Journal*, 18(21):8827–8834, nov 2018. doi:10.1109/jsen.2018.2868135
- [18] Austin Downey, Mohammadkazem Sadoughi, Simon Laflamme, and Chao Hu. Fusion of sensor geometry into additive strain fields measured with sensing skin. *Smart Materials and Structures*, 27(7):075033, jun 2018. doi:10.1088/1361-665x/aac4cd
- [17] Mohammadkazem Sadoughi, Austin Downey, Jin Yan, Chao Hu, and Simon Laflamme. Reconstruction of unidirectional strain maps via iterative signal fusion for mesoscale structures monitored by a sensing skin. *Mechanical Systems and Signal Processing*, 112:401–416, nov 2018. doi:10.1016/j.ymsp.2018.04.023
- [16] Andrea Meoni, Antonella D’Alessandro, Austin Downey, Enrique García-Macías, Marco Rallini, Annibale Luigi Materazzi, Luigi Torre, Simon Laflamme, Rafael Castro-Triguero, and Filippo Ubertini. An experimental study on static and dynamic strain sensitivity of embeddable smart concrete sensors doped with carbon nanotubes for SHM of large structures. *Sensors*, 18(3):831, mar 2018. doi:10.3390/s18030831
- [15] Austin Downey, Antonella D’Alessandro, Filippo Ubertini, and Simon Laflamme. Automated crack detection in conductive smart-concrete structures using a resistor mesh model. *Measurement Science and Technology*, 29(3):035107, feb 2018. doi:10.1088/1361-6501/aa9fb8

- [14] Austin Downey, Antonella D'Alessandro, Simon Laflamme, and Filippo Ubertini. Smart bricks for strain sensing and crack detection in masonry structures. *Smart Materials and Structures*, 27(1):015009, nov 2017. doi:10.1088/1361-665x/aa98c2
- [13] Austin Downey, Simon Laflamme, and Filippo Ubertini. Experimental wind tunnel study of a smart sensing skin for condition evaluation of a wind turbine blade. *Smart Materials and Structures*, 26(12):125005, oct 2017. doi:10.1088/1361-665x/aa9349
- [12] Austin Downey, Antonella D'Alessandro, Micah Baquera, García-Macías, Daniel Rolfes, Filippo Ubertini, Simon Laflamme, and Rafael Castro-Triguero. Damage detection, localization and quantification in conductive smart concrete structures using a resistor mesh model. *Engineering Structures*, 148:924–935, 2017. doi:10.1016/j.engstruct.2017.07.022
- [11] Austin Downey, Filippo Ubertini, and Simon Laflamme. Algorithm for damage detection in wind turbine blades using a hybrid dense sensor network with feature level data fusion. *Journal of Wind Engineering and Industrial Aerodynamics*, 168:288–296, sep 2017. doi:10.1016/j.jweia.2017.06.016
- [10] Antonella D'Alessandro, Filippo Ubertini, Enrique García-Macías, Rafael Castro-Triguero, Austin Downey, Simon Laflamme, Andrea Meoni, and Annibale Luigi Materazzi. Static and dynamic strain monitoring of reinforced concrete components through embedded carbon nanotube cement-based sensors. *Shock and Vibration*, 2017:1–11, 2017. doi:10.1155/2017/3648403
- [9] Enrique García-Macías, Austin Downey, Antonella D'Alessandro, Rafael Castro-Triguero, Simon Laflamme, and Filippo Ubertini. Enhanced lumped circuit model for smart nanocomposite cement-based sensors under dynamic compressive loading conditions. *Sensors and Actuators A: Physical*, 260:45–57, jun 2017. doi:10.1016/j.sna.2017.04.004
- [8] Austin Downey, Antonella D'Alessandro, Filippo Ubertini, Simon Laflamme, and Randall Geiger. 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*, 26(6):065008, may 2017. doi:10.1088/1361-665x/aa6b66
- [7] Austin Downey, Chao Hu, and Simon Laflamme. Optimal sensor placement within a hybrid dense sensor network using an adaptive genetic algorithm with learning gene pool. *Structural Health Monitoring*, page 147592171770253, apr 2017. doi:10.1177/1475921717702537
- [6] Austin Downey, Simon Laflamme, and Filippo Ubertini. Reconstruction of in-plane strain maps using hybrid dense sensor network composed of sensing skin. *Measurement Science and Technology*, 27(12):124016, nov 2016. doi:10.1088/0957-0233/27/12/124016
- [5] Austin Downey, Liang Cao, Simon Laflamme, Douglas Taylor, and James Ricles. High capacity variable friction damper based on band brake technology. *Engineering Structures*, 113:287–298, apr 2016. doi:10.1016/j.engstruct.2016.01.035

- [4] Hussam Saleem, Austin Downey, Simon Laflamme, Matthias Kollosche, and Filippo Ubertini. Investigation of dynamic properties of a novel capacitive-based sensing skin for nondestructive testing. *Materials Evaluation*, 73(10):1384–1391, oct 2015. URL: <http://www.scopus.com/inward/record.url?eid=2-s2.0-84948392242&partnerID=MN8TOARS>
- [3] Liang Cao, Austin Downey, Simon Laflamme, Douglas Taylor, and James Ricles. Variable friction device for structural control based on duo-servo vehicle brake: Modeling and experimental validation. *Journal of Sound and Vibration*, 348:41–56, jul 2015. doi:10.1016/j.jsv.2015.03.011
- [2] Jingzhe Wu, Chunhui Song, Hussam S Saleem, Austin Downey, and Simon Laflamme. Network of flexible capacitive strain gauges for the reconstruction of surface strain. *Measurement Science and Technology*, 26(5):055103, apr 2015. doi:10.1088/0957-0233/26/5/055103
- [1] Simon Laflamme, Filippo Ubertini, Hussam Saleem, Antonella D’Alessandro, Austin Downey, Halil Ceylan, and Annibale Luigi Materazzi. Dynamic characterization of a soft elastomeric capacitor for structural health monitoring. *Journal of Structural Engineering*, 141(8):04014186, aug 2015. doi:10.1061/(asce)st.1943-541x.0001151

Peer-Reviewed Conference Proceedings

- [26] James Ricles, Safwan Al-Subaihawi, Liang Cao, Thomas M Marullo, Austin Downey, and Simon Laflamme. 3d real time hybrid simulation of a tall building with a novel rotary friction damper outrigger system for multi-hazard mitigation. *18th world conference on earthquake engineering, 2024*
- [25] Liang Cao, Faisal Nissar Malik, Safwan Al-Subaihawi, Wendy Miao, James Ricles, Thomas M Marullo, Chinmoy Kolay, Austin Downey, and Simon Laflamme. Real time hybrid simulation (RTHS) of a two-story reinforced concrete building equipped with a next generation base isolation system subjected to earthquake loads. *18th world conference on earthquake engineering, 2024*
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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 mwents. *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

- [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 Bakos. High-rate structural health monitoring: Part-II embedded system design. In *IMAC 41*, February 2023
- [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
- [17] Austin Downey, Cyrus Vakili Rad, Alexander Vereen, Fariha Mir, Subramani Sockalingam, and Sourav Banerjee. Sensing skin for in-service monitoring of woven composite laminates subjected to impact damage. In *46th Annual Review of Progress in Quantitative Nondestructive Evaluation*, page 6839. CNDE/ASME, 2019. URL: <https://www.iastatedigitalpress.com/qnde/article/id/8568/>
- [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

Ph.D. Dissertation

- [1] Austin Robert Johnson Downey. *Sensing skin for the structural health monitoring of mesoscale structures*. PhD thesis, Iowa State University, 2018. URL: <https://dr.lib.iastate.edu/entities/publication/d32d4b6a-14d1-461d-b968-ebc4a34802>

Invited Presentations

- [16] Brief: Digital Twin Testbed for Advanced Battery Management and Utilization in Naval System. *Joint DoD Power Sources Technical Working Group and Military Power Sources Consortium Meeting*, May 24, 2023
- [15] Developing High-rate Digital Twins for Structures Under Shock Loading. *University of Perugia - Structural Engineering Seminar Series*, October 26, 2022
- [14] High-rate Model Updating for Structures Experiencing Shock. *AFRL Munitions Directorate Summer Faculty Fellowship Program - Seminar*, July 14, 2022
- [13] Real-time Model Updating for Structures Experiencing High-rate Dynamic Events. *University of Strathclyde*, December 11th, 2020
- [12] Multi model Data Assimilation for Naval Ship Structures. *Research brief for Summer Faculty Research Program (NSWC-Carderock division)*, August 3rd, 2020
- [11] Progress Towards Real-Time Decision-Making for Structures Experiencing High-Rate Dynamics. *AFRL Munitions Directorate Summer Faculty Fellowship Program - Seminar*, July 23, 2019
- [10] Solutions for Mesoscale Monitoring. *University of Virginia Seminar Series*, May 2, 2019
- [9] Solutions for Mesoscale Monitoring. *NHERI Lehigh Seminar Series*, March 28, 2019
- [8] Self-sensing Structural Materials for the Condition Monitoring of Structures. *Intelligent Infrastructure Engineering seminars - Iowa State University*, March 3, 2018
- [7] Solutions for Mesoscale Monitoring. *System Reliability and Safety Laboratory at Iowa State University*, February 8, 2018

- [6] Monitoring of Historical Structures in Central Italy. *Guest lecture for CE 101 at Iowa State University*, November 29, 2017
- [5] Advancements in the Field of Smart-Materials for Structural Health Monitoring. *Guest lecture for CE 549 at Iowa State University*, November 6, 2017
- [4] A Data-driven Approach for Damage Detection in Large Structures using a Dense Array of Soft Elastomeric Capacitors. *Iowa State University Structure Seminar Series*, March 15, 2017
- [3] Algorithm for Damage Detection in Wind Turbine Blades using a Hybrid Dense Sensor Network with Feature Level Data Fusion. *Wind Energy Science, Engineering and Policy (WESEP), Real-Time Research Collaborative*, February 13, 2017
- [2] Smart Materials for Structural Health Monitoring. *University of Perugia Working Group on Smart Structures and Building Physics*, October 20, 2016
- [1] Large Area Sensors for the Monitoring of Wind Turbine Blades. *Wind Energy Science, Engineering and Policy (WESEP), Real-Time Research Collaborative*, May 12, 2015

Patents

- [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

- [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. UofSC 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 Downey. A uav rapidly-deployable stage sensor package for flood monitoring in undersampled watersheds. Discover USC, March 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 Textbooks

- [1] Austin Downey and Laura Micheli. Open vibrations. GitHub, may 2021. URL: <https://github.com/austindowney/Open-Vibrations>

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>

Open Source Hardware

- [8] Jacob Martin, Austin R.J. Downey, Win Janvrin, and Angelo Varillas. Compact-NMR (cNMR), August 2023. URL: <https://github.com/ARTS-Laboratory/Compact-NMR>
- [7] Joud Satme and Austin Downey. Drone delivered vibration sensor. GitHub, 2022. URL: <https://github.com/ARTS-Laboratory/Drone-Delivered-Vibration-Sensor>
- [6] Malichi Flemming and Austin Downey. Smart penetrometer with edge computing. GitHub, April 2022. URL: <https://github.com/ARTS-Laboratory/Smart-Penetrometer-with-Edge-Computing>

- [5] Corinne Smith and Austin Downey. UAV deployable stage height sensor. GitHub, 2022. 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] Corinne Smith, Parker Lovett, John McCain, and Austin Downey. Iot cellular dam water level sensor. GitHub, 2022. URL: <https://github.com/ARTS-Laboratory/IoT-Cellular-Dam-Water-Level-Sensor>
- [2] Mohamed Abdelwahab, Antonio Fonce, Joud Satme, Austin R.J. Downey, and Daniel Gibson. In-situ-water-quality-sensor, August 2023. 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 Datasets

- [1] Devon Goshorn, Joud Satme, and Austin Downey. Dataset-7-forced-vibration-and-shock, October 2023. URL: <https://github.com/High-Rate-SHM-Working-Group/Dataset-7-forced-vibration-and-shock>

Mentorship and Advisement at the University of South Carolina

Current Ph.D. Students

- [7] Nathaniel Cooper; Mechanical Engineering, “Fuel Cell Safety Systems for Electric Aircraft”, 2023 - present.
- [6] Jarrett Peskar; Mechanical Engineering, “Electro-thermo Digital Twin of Lithium-ion Batteries”, 2021 - present.
- [5] 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.
- [4] Joud Satme; Mechanical Engineering, “Real-time Computing at the Edge for High-rate Dynamics”, 2021 - present.
- [3] Emmanuel Ogunniyi; Mechanical Engineering, “Methodologies for Real-Time Decision-Making for structures”, 2021- present.
- [2] Puja Chowdhury; Mechanical Engineering, “A Programming Model and Platform Architecture for Real-time Machine Learning for Sub-second Systems”, 2020 - present.
- [1] Alex Vereen; Mechanical Engineering, “Real-Time Decision Making for Structure Under Impact”, 2020 - present.

Current M.S. Students

- [6] Ryan Yount; Mechanical Engineering, “Development of sensor network of vibration sensors”, 2022 - present.
- [5] George Anthony; Mechanical Engineering, “Real-time Control of Safety Systems for Electric Aircraft”, 2023 - present.

- [4] Richard Hailey; Mechanical Engineering, “Active Thermal Control of Electric Power Systems”, 2022 - present.
- [3] Leighton Gay; Mechanical Engineering, “Distributed Control for Power Electronics”, 2022 - present.
- [2] Braden Priddy; Mechanical Engineering, “Real-time Model Updating for Digital Twins”, 2022 - present.
- [1] James Scheppegregg; Nuclear Engineering, Real Time High-rate Decision Making for Functional Prognosis of Complex Mechanical Systems 2019 - present

Graduated Ph.D. Students

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

Graduated M.S. Students

- [5] Jacob Martin; Physics (dual advised/dual projects), “A method for single-Particle Magnetic Particle Spectroscopy with a Nanofabricated Coplanar Stripline” with significant work in Mechanical Engineering - “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 M.E. Students with Significant Research Component

- [2] Claud J. Boyd; M.S. “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

- [24] Bariat Shuai; Benedict College - Engineering, “Embedded Topological Data Analysis - Hardware”, 2023 - present.
- [23] Nickola Simpson; Benedict College - Engineering, “Embedded Topological Data Analysis - Software”, 2023 - present.
- [22] Gabriel Morris; Electrical Engineering, “UAV Deployable Sensor Packages and Cameras for Flood Monitoring”, 2023 - present.
- [21] Mumin Adhami; Mechanical Engineering, “Discrete Element Method (DEM) modeling particle dampers”, 2023 - present.

- [20] Angelo Varillas; Physics, “Quantum Sensing of Environmental Contaminates”, 2023 - present.
- [19] Brandon Rogers; Mechanical Engineering, “FEA model updating of walking bridge”, 2023 - present.
- [18] Ty Dangerfield; Mechanical Engineering, “Wireless Geophone Sensor Development”, 2023 - present.
- [17] Devon Goshorn; Computer Engineering, “Automated testing of PCBs under shock”, 2023 - present.
- [16] Matthew Burnett; Computer Engineering, “Design of experiments in laser power bed additive manufacturing”, 2022 - present.
- [15] Antonio Fonce; Computer Engineering, “Real-time control of high-speed structures”, 2022 - present.
- [14] Jackie Wang; Computer Engineering, “Machine Learning on field programmable gate array processors”, 2022 - present. Awarded: Magellan Journey Scholar \$1,000; 2023 McNair Summer Fellowship \$3,000.
- [13] David Wamai; Computer Science, “Topological data analysis on field programmable gate array processors”, 2022 - present; 2023 McNair Summer Fellowship \$3,000; NASA South Carolina Space Grant Consortium Undergraduate Student Research Award \$7,500.
- [12] Connor Madden; Mechanical Engineering, “Electric vertical lift system testbed development”, 2022 - present.
- [11] Trotter Roberts; Mechanical Engineering, “Active control of hypersonic structures”, 2022 - present.
- [10] Nicholas Liger; Mechanical Engineering, “In situ monitoring of additive manufacturing processes”, 2022 - present.
- [9] Nick Corbin; Civil Engineering, “In situ monitoring of water quality parameters”, 2022 - present.
- [8] 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.
- [7] Christopher Heaps; Mechanical Engineering, “Development of Motionless Rain Gauge”, 2022 - present. Awarded: Magellan Journey Scholar \$1,000; 2023 McNair Summer Fellowship \$3,000.
- [6] Korebami Adebajo; Mechanical Engineering, “In Situ Environmental Sensing”, 2022 - present. Awarded: Magellan Journey Scholar \$1,000; Magellan Apprentice Scholar \$1,000
- [5] Joseph Johnson; Mechanical Engineering, “UAV-deployed soil sensor”, 2022 - present. Awarded Mike and Ann Sutton Fellowship \$3,000
- [4] Jacob Vaught; Mechanical Engineering, Electrical Engineering, Computer Engineering, “FPGA-based signal processing on embedded systems”; Awarded Mike and Ann Sutton Fellowship \$1,500, 2022 - present.
- [3] Parker Huggins; Mechanical Engineering, “Ship tracking using SAR”, 2021 - present. Awarded: Magellan Journey Scholar \$1,000; 2022 McNair Summer Fellowship \$2,500, Honors College Research Grant, \$3,000.

- [2] John White; Mechanical Engineering, “Signal Conditioning Electronics for Low-cost Nuclear Magnetic Resonance”, 2021 - present. Awarded: Magellan Scholar, \$3,000.
- [1] Daniel “Nile” Coble; Mechanical Engineering, “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 - present.

Undergraduate Students Advised

- [47] Mukeh Foh; Massachusetts Institute of Technology, Mechanical Engineering, “Autonomous Sensing Systems”, Summer 2023.
- [46] Ryan Yount; Mechanical Engineering, “Development of sensor network of vibration sensors”, 2022 - 2023. Awarded 2022 McNair Summer Fellowship \$2,500.
- [45] 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.
- [44] Ryan Brown; Mechanical Engineering, “Development of Motionless Rain Gauge”, 2022 - 2023.
- [43] Miles Wedeking; Computer Info Systems, “Signal processing on embedded systems”, 2022.
- [42] Connor Nee; Mechanical Engineering, “Multiphysics modeling of electric vertical lift systems”, 2022.
- [41] Alex Toth; Mechanical Engineering, “Real-time thermal control for power inverters”, 2022 - 2023. Awarded 2022 McNair Summer Fellowship \$2,500.
- [40] Akil Dyson; Benedict College - Engineering, “High-rate impact testing”, 2022 - 2022. 39
- [39] Quintin Hughes; Mechanical Engineering, “In Situ monitoring of magnetic particles in aquatic conditions”, 2022 - 2022.
- [38] Zachary Ziehl; Information Technology, “Real-time decision making for structures experiencing shock”, 2022 - 2022. Awarded 2022 McNair Summer Fellowship \$2,500.
- [37] Chris Nelson; Mechanical Engineering, “Sensing Skins for Structural Health Monitoring”, 2022 - 2022.
- [36] Ben Brown; Mechanical Engineering, “Development of sensor network of water height sensors”, 2022 - 2022.
- [35] Malichi Flemming; Mechanical Engineering, “In Situ Monitoring of Additive Manufacturing”, 2021 - 2022.
- [34] Ethan “Lake” Williams; Mechanical Engineering, “Modeling of NMR spectroscopy”, Awarded a Science Undergraduate Research Fellowship (SURF) and Magellan Mini-Grant, \$3,000, 2020 - 2022.
- [33] Leighton Gay; Mechanical Engineering, “Active Control of Structures Using Piezo-electrics”, 2021 - 2022. Transitioned to a M.S. at the UofSC.

- [32] Christian Stone; Mechanical Engineering, “Mechanical systems for Low-cost Nuclear Magnetic Resonance”, 2021 - 2022.
- [31] Richard Hailey; Mechanical Engineering, “Active Thermal Control of Electric Power Systems”, 2021 - 2022. Transitioned to a M.S. at the UofSC.
- [30] Braden Priddy; Mechanical Engineering, “Long short-term memory for time series predictions”, 2020 - 2022. Transitioned to a M.S. at the UofSC.
- [29] Shekinah Sanders; Mechanical Engineering, “UAV-deployable rain gauge”, 2022 - 2022.
- [28] Ayush Bajaj; Mechanical Engineering, “Low-power Plasma generator”, 2022 - 2022.
- [27] 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.
- [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 UofSC.
- [20] Jarrett Peskar; Mechanical Engineering, “Development of a battery simulator on embedded hardware”, 2020 - 2021. Transitioned to a Ph.D. at the UofSC.
- [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 UofSC.
- [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 UofSC.
- [10] Zhymir Thompson; Computer Science, “Generative adversarial network for data synthesis”, 2020 - 2021. Transitioned to a Ph.D. at the UofSC.
- [9] John Cooley; Mechanical Engineering, “Digital twins for navy electric ship applications”, 2020 - 2020. Transitioned to a M.S. at the UofSC.
- [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 UofSC.
- [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 UofSC.
- [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

- [5] Sam Cancilla, June - July 2023.
- [4] Aaron Fonce, June - July 2023.
- [3] Jaden Coffey, June - July 2023.
- [2] Adelaide Rogers, June - July 2023.
- [1] Christopher Heaps, May - July 2019.

Research Staff Supervised

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

Mentorship Experiences at Iowa State University as 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 windtunnel 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.

- [35] **David Wamai**, NASA South Carolina Space Grant Consortium Undergraduate Student Research Award, NASA South Carolina Space Grant Consortium Undergraduate Student Research Award, \$7,500.00, 2023
- [34] **Parker Huggins**, Honors College Research Grant , NMR, \$3,000.00, 20203
- [33] **Daniel Coble**, Honors College Research Grant , RTML funding, \$3,000.00, 2023

- [32] **Jackie Wang**, Magellan Journey Scholar, NMR: Advanced Sine Wave Generation and Analysis for Particle Concentration Measurement and Fuel Classification, \$1,000.00, 2023
- [31] **Korebami Adebajo**, Magellan Apprentice award, Simulink modeling of an electric airplane, \$1,000.00, 2023
- [30] **Winford Janvrin**, Magellan Apprentice grant, Flow Through Water Quality System, \$1,000.00, 2023
- [29] **Corinne Smith**, AIAA Guidance, Navigation, and Control Technical Committee - Undergraduate Conference Experience, Travel award for AIAA SciTech, \$850.00, 2022
- [28] **Corinne Smith**, Honors College Research Grant Award, UAV sensor package development , \$1,500.00, 2022
- [27] **Corinne Smith**, Magellan Voyager program, Travel to IEEE Sensors, \$500.00, 2022
- [26] **Christopher Heaps**, Magellan Journey award, Development of a UAV-deployable rain gauge, \$1,000.00, 2022
- [25] **Korebami Adebajo**, Magellan Journey award, Thermo-mechanical-electrical digital twin of an electric vertical lift craft, \$1,000.00, 2022
- [24] **Winford Janvrin**, Magellan Journey award, Flow-through environmental system, \$1,000.00, 2022
- [23] **Parker Huggins** , Magellan Journey award, FPGA implementation fo SAR data processing , \$1,000.00, 2022
- [22] **Zachary Ziehl**, McNAIR Junior Fellowship for undergraduate research, real-time decision making for high-rate dynamics, \$2,500.00, 2022
- [21] **Parker Huggins** , McNAIR Junior Fellowship for undergraduate research, SAR processing in real-time, \$2,500.00, 2022
- [20] **Corinne Smith**, McNAIR Junior Fellowship for undergraduate research, Water sensor, \$2,500.00, 2022
- [19] **Ryan Yount**, McNAIR Junior Fellowship for undergraduate research, UAV network of vibration sensors, \$2,500.00, 2022
- [18] **Joesph Jhonson**, Michael and Ann Sutton Fellowship, Active Vibration Control in Hypersonic Vehicles through Piezoelectric Devices, \$1,500.00, 2022
- [17] **Corinne Smith**, Michael and Ann Sutton Fellowship, Wireless sensor network for tracking flash floods, \$1,500.00, 2022
- [16] **Hung-Tien Huang**, McNAIR Junior Fellowship for undergraduate research, Sound-based wildfire detection, \$2,000.00, 2021
- [15] **Sebastian Ionita**, McNAIR Junior Fellowship for undergraduate research, Design of a custom polymer 3D printer for in-situ component qualification, \$2,000.00, 2021
- [14] **Daniel Gibson**, McNAIR Junior Fellowship for undergraduate research, Development of UAV controls within the ceiling effect domain, \$2,000.00, 2021
- [13] **Corrine Smith**, Magellan Scholar , A network of UAV deployable sensor packages for monitoring hydraulic parameters during severe weather events, \$3,000.00, 2021
- [12] **Daniel Coble**, Magellan Scholar , High-rateMachine Learning for Structural State Estimation, \$3,000.00, 2021

- [11] **Eathan Williams**, Magellan Mini-Grant, Benchtop Nuclear Magnetic Resonance (NMR), \$1,000.00, 2021
- [10] **Eathan Williams**, Honors College Research Grant , Nuclear Magnetic Resonance (NMR), \$2,000.00, 2021
- [9] **Joud Satme**, Magellan Scholar , Drone development for structural health monitoring, \$2,750.00, 2020
- [8] **Nicholas Peraino**, Magellan Scholar , Identification of objects with passively sensing artificial seaweed, \$2,750.00, 2020
- [7] **Jacob Womick**, Magellan Scholar , Analysis of Battery Health During Rapid Energy Transfer within a Battery Network, \$3,000.00, 2020
- [6] **Saif Wilkes-Davis**, McNAIR Junior Fellowship for undergraduate research, Motionless rain gauge, \$2,000.00, 2020
- [5] **Ishrat Singh**, Magellan Scholar , Low latency Nonlinear Time Series Analysis and Prediction Using Multilayer Perceptrons, \$2,750.00, 2019
- [4] **Ishrat Singh**, Honors College Research Grant , Real-time machine learning of vibration signals, \$3,000.00, 2019
- [3] **Claire Drnek**, Magellan Scholar , Gait Analysis and Person Identification Using Human-Structure Interaction, \$2,500.00, 2019
- [2] **Michael Gallagher**, Honors College Research Grant , Real-Time State Estimation of Structural Systems for the United State Air Force, \$1,560.00, 2019
- [1] **Bianca Riello**, Honors College Research Grant , Methodologies for integrated control and data acquisition of a structural test bed, \$1,250.00, 2018

Courses Taught

Lecture

- [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.

Independent Study / Self Study

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

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

Conference Sessions Organized/Chaired

- [10] SEM IMAC XLI (2023); 059 Transfer Learning and Population-based SHM
- [9] SEM IMAC XLI (2023); 066 High-Rate Structural Health Monitoring and Prognostics
- [8] SPIE Smart Structures + NDE 2022; Smart sensor networks for civil infrastructure monitoring
- [7] SEM IMAC XL (2022); 067 Deep Learning for Dynamic Condition Monitoring
- [6] ASME QNDE 2021; 16-02: Structural Health Monitoring
- [5] ASME QNDE 2021; 08-02: NDE for Additive Manufacturing
- [4] SEM IMAC XXIX (2021); 058 Panel Discussion for High-Rate Structural Health Monitoring and Prognostics
- [3] SEM IMAC XXIX (2021); 030 High-Rate Structural Health Monitoring and Prognostics
- [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

- [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.

Seminars Organized at the University of South Carolina

- [4] Donghyeon Ryu from New Mexico Tech April 23th 2022
- [3] Daniel Kiracofe from The University of Cincinnati April 14 2022
- [2] Marcus Perry from Strathclyde University November 19th 2020
- [1] James Ricles from Lehigh University February 12th 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