

Luke Demo, Ph.D., P.E.

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Professional Profile

Dr. Luke Demo specializes in structural design and analysis, forensic evaluation, advanced sensing technologies, machine learning, and structural health monitoring. Dr. Demo brings extensive professional design experience in steel, concrete, wood and FRP composites structures, along with a rigorous background in research and experimental testing.

Throughout Dr. Demo's design experience, he has delivered cost-effective structural solutions for numerous new and existing buildings in California. He has developed innovative finite element analysis (FEA) models, including for the design of large retaining walls and post-tensioned concrete structures. He provided strategic leadership, directly managing project coordination with architects, contractors, and owners, and led comprehensive plan check meetings with municipal building departments.

Dr. Demo has peer reviewed critical infrastructure projects, such as the \$9.5 billion JFK Airport New Terminal One where he identified and helped resolve over 100 potential deficiencies. Additionally, Dr. Demo led research at Columbia University, pioneering self-sensing damage detection technologies for fiber-reinforced polymer (FRP) composites used in electric vehicle battery enclosures. His innovations substantially reduced production costs and enhanced predictive maintenance through AI-driven fatigue life prediction models.

Dr. Demo is a licensed professional engineer in California and New York and actively contributes to professional organizations such as SEAoNY and SEAONC to advance post-disaster structural safety assessments.

Academic Credentials & Professional Honors

M.Phil., Civil Engineering and Engineering Mechanics, Columbia University, 2024

Ph.D., Civil Engineering and Engineering Mechanics, Columbia University, 2024

M.S., Civil Engineering and Engineering Mechanics, Columbia University, 2021

B.S., Structural Engineering, University of California, San Diego, 2015

Licenses and Certifications

Professional Engineer Civil, California, #90483

Professional Engineer, New York, #103198

Academic Appointments

Instructor, Civil Engineering and Engineering Mechanics, Columbia University, 2023

Prior Experience

Project Engineer, Harrell Kane Structural Engineers, 2015 - 2019

Professional Affiliations

Structural Engineers Association of Northern California

Structural Engineers Association of New York

American Society of Civil Engineers

Patents

US Patent 20230366846: Carbon Fiber Composite Panel with Integrated Fault Detection and Health Monitoring, November 2023 (Feng MQ, Aitharaju VR, Demo LD, Tronci EM)

Publications

Demo, L. B., Tronci, E. M., & Feng, M. Q. (2023). Multifunctional Fiber-Reinforced Polymer Composites for Damage Detection and Memory. In *Journal of Composites Science* (Vol. 7, Issue 9, p. 383). MDPI AG. <https://doi.org/10.3390/jcs7090383>

Demo, L. B., Tronci, E. M., Nieduzak, T. B., Feng, M. Q., & Aitharaju, V. R. (2024). Low-cost sensor-based damage localization for large-area monitoring of FRP composites. In *Smart Materials and Structures* (Vol. 33, Issue 6, p. 065042). IOP Publishing. <https://doi.org/10.1088/1361-665x/ad4e7b>

Nieduzak, T. B., Tronci, E. M., Zhou, T., Demo, L. B., Feng, M. Q., & Aitharaju, V. (2025). Heat transfer model for temperature-sensing polymer composite EV battery enclosure. *Composites. Part B, Engineering*, 296(112258), 112258. doi:10.1016/j.compositesb.2025.112258

Demo, L. B., Tronci, E. M., Nieduzak, T. B., & Feng, M. Q. (2024, May 9). Damage localization in large-area FRP composites using a parallel array of self-sensing carbon fiber tows. In P. J. Shull, T. Yu, A. L. Gyekenyesi, & H. F. Wu (Eds.), *Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVIII*. doi:10.1117/12.3010864

Nieduzak, T. B., Tronci, E. M., Zhou, T., Demo, L. B., & Feng, M. Q. (2024, May 9). Heat transfer analysis through hybrid FRP composite for self-sensing lithium-ion battery enclosure. In P. J. Shull, T. Yu, A. L. Gyekenyesi, & H. F. Wu (Eds.), *Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVIII*. doi:10.1117/12.3010566

Tronci, E. M., Nagakubo, S., Hieda, H., Demo, L., & Feng, M. Q. (2022, April 18). Low-power multi-hop wireless sensor network for vibration monitoring of large structures. In P. J. Shull, T. Yu, A. L. Gyekenyesi, & H. F. Wu (Eds.), *Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVI*. doi:10.1117/12.2615700