

Exponent®
Engineering & Scientific Consulting

Nate Levine, Ph.D., P.E., S.E.

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Professional Profile

Dr. Levine specializes in the design, analysis, evaluation, repair, and retrofit of buildings. He has extensive experience in structural health monitoring (SHM), having developed methods to use computer graphics and computer vision for post-disaster infrastructure assessment.

Dr. Levine has worked on a variety of building types, including laboratories, hospitals, K-12 education, and industrial facilities, and with a variety of materials, including steel, concrete, masonry, and wood. Dr. Levine has developed complex details for repairs and seismic retrofits to existing structures with minimal disruption. As part of a national infrastructure monitoring and management effort, he developed methods for monitoring inland waterway navigation structures, such as locks and dams. Dr. Levine's experience in SHM extends to various technologies, including vibration-based SHM and drones for visual monitoring and post-disaster condition assessment. He also has experience conducting large-scale structural testing.

Dr. Levine's Ph.D. research focused on the use of drones for rapid post-earthquake performance assessment of buildings. By connecting a photographic drone survey with a building information model, he developed a method to link automatically identified structural damage with a performance-based earthquake assessment. This work enables rapid, automated assessment of earthquake damaged buildings. To develop and prototype this method, Dr. Levine created a 3D virtual computer graphics environment where drone surveys and images of earthquake-damaged buildings could be simulated photorealistically. This virtual environment enables research on novel methods for computer vision-based post-disaster response where existing data may be unavailable.

Academic Credentials & Professional Honors

Ph.D., Civil Engineering, University of Illinois, Urbana-Champaign, 2022

M.S., Civil and Environmental Engineering, Stanford University, 2011

B.S., Geological and Environmental Sciences, Stanford University, 2010

Licenses and Certifications

Professional Structural Engineer, Alaska, #216243

Professional Engineer Civil, California, #81451

Professional Structural Engineer, California, #6436

Professional Engineer, New Mexico, #29700

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Academic Appointments

Research Assistant, University of Illinois at Urbana-Champaign, 2017-2022

Prior Experience

Project Engineer, KPW Structural Engineers, 2014-2017

Structural Design Engineer, Rutherford + Chekene, 2011-2014

Professional Affiliations

American Society of Civil Engineers (ASCE)

Structural Engineers Association of Northern California (SEAONC)

Publications

Levine, N., Golecki, T., Gomez, F., Spencer, B.F., Jr. Bayesian model updating of concrete-embedded miter gate anchorages and implications for design. Structural and Multidisciplinary Optimization. 2023. 66, 60. https://doi.org/10.1007/s00158-023-03521-z

Levine N.M., Narazaki Y., Spencer B.F., Jr. Development of a Building Information Model-Guided Post-Earthquake Building Inspection Framework using 3D Synthetic Environments. Earthquake Engineering and Engineering Vibration. 2023. https://doi.org/10.1007/s11803-023-2167-y

Levine, N.M. (2022): 3DIFICE: A Synthetic Dataset for Training Computer Vision Algorithms to Recognize Earthquake Damage to Reinforced Concrete Structures. University of Illinois at Urbana-Champaign. https://doi.org/10.13012/B2IDB-6415287_V1

Levine N.M., Narazaki Y., Spencer, B.F., Jr. Performance-based post-earthquake building evaluations using computer vision-derived damage observations. Advances in Structural Engineering. 2022. doi:10.1177/13694332221119883

Levine, N.M.; Spencer, B.F., Jr. Post-Earthquake Building Evaluation Using UAVs: A BIM-Based Digital Twin Framework. Sensors. 2022. 22, 873. https://doi.org/10.3390/s22030873

Eick, B.A., Levine, N.M., Smith, M.D., Spencer, B.F. Fatigue life updating of embedded miter gate anchorages of navigation locks using full-scale laboratory testing. Structure and Infrastructure Engineering. 2022; https://doi.org/10.1080/15732479.2021.2023588

Presentations

Levine, N.M. Post-Earthquake Building Performance Assessment using BIM and UAVs. Presentation. The 2nd ZHITU Symposium on Advances in Civil Engineering, UNIST, Ulsan, South Korea, 2021.

Levine, N.M. Large-Scale Testing of a Concrete-Embedded Miter Gate Anchorage and Implications for Infrastructure Monitoring. Webinar: Innovative Structural Engineering Research Spotlight, Structural Engineering Institute, Illinois Chapter, 2021.

Levine, N.M., Eick, B.A., Johnson, E.O., Spencer, B.F., & Smith, M. D. Predicting Fatigue Life of Miter Gate Anchorages with Stochastic Modeling and Limited Sensor Data. In Proceedings of the 12th International Workshop on Structural Health Monitoring, 2019 https://doi.org/10.12783/shm2019/32131.

Peer Reviews

Computer-Aided Civil and Infrastructure Engineering

Engineering Structures