



**Exponent**<sup>®</sup>  
Engineering & Scientific Consulting

## William R. Locke, Ph.D.

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### Professional Profile

Dr. Locke specializes in the static and dynamic evaluation of Building and Bridge systems constructed using wood, concrete, and steel. His specialized experience involves the use of advanced engineering analysis of buildings and structures, statistical analysis, and structural health monitoring (SHM) techniques to identify structural properties and classify damage.

Prior to joining Exponent, Dr. Locke was a graduate student researcher at Clemson University, where he earned a Ph.D. in civil engineering. He was the recipient of the Graduate Assistance in Areas of National Need (GAANN) and National Science Foundation Research Traineeship (NRT) fellowships awarded to Clemson University by the US Department of Education and National Science Foundation, respectively. As a GAANN and NRT fellow, Dr. Locke took additional courses and worked on interdisciplinary research teams to solve problems related to identifying and mitigating the vulnerabilities of complex, critical, and interdependent infrastructure systems. His primary research focused on the development of an indirect mobile health monitoring strategy that utilizes vehicle mounted sensors to continuously evaluate the health of bridge structures. Through his work, he was able to experimentally demonstrate the system identification capabilities of the indirect methodology, while also developing a Bayesian estimation framework capable of classifying physical damage through finite element model updating.

Apart from his primary academic institution, Dr. Locke has conducted research at the Los Alamos National Labs - Engineering Institute in New Mexico and at the Fraunhofer Institute for Structural Durability and System Reliability in Germany. While at these institutions, he gained experience conducting static and dynamic experiments on full-scale and lab-scale systems, working with nonlinear systems, performing data-driven uncertainty quantification on computational models, and utilizing machine learning techniques for SHM. Dr. Locke also has industry experience from an internship with the NCDOT and from co-ops with Infrastructure Engineering and Construction Science and Engineering, Inc. His industry work allowed him to gain experience overseeing construction projects, conducting visual inspections, and performing ASTM standard testing.

Dr. Locke's experimental research received recognition by the Society of Experimental Mechanics, where his paper titled, "Exploring the Feasibility of Drive-by Health Monitoring on Short Span Bridges Using OMA Techniques," received the Best Student Paper Award in the Dynamics of Civil Structures Technical Division at IMAC-XXXIX.

### Academic Credentials & Professional Honors

Ph.D., Civil Engineering, Clemson University, 2021

M.S., Civil Engineering, Clemson University, 2017

B.S., Civil Engineering, Clemson University, 2015

Best Student Paper Award in the Dynamics of Civil Structures Technical Division at IMAC-XXXIX, 2021

NRT Fellowship, 2019-2021

GAANN Fellowship, 2016-2019

Los Alamos Dynamic Summer School Fellowship, 2017

RCI-IIBEC Student Scholar, 2013

## Prior Experience

International Exchange Student, Fraunhofer Institute for Structural Durability and System Reliability LBF, 2018

LADS Intern, Los Alamos National Labs – Engineering Institute, 2017

Co-op Student, Infrastructure Engineering (Now CONSOR), 2014-2015

Summer Intern, NCDOT, 2014

Co-op Student, Construction Science and Engineering, Inc., 2013

## Professional Affiliations

American Concrete Institute (ACI)

American Society of Civil Engineers (ASCE)

Society of Experimental Mechanics (SEM)

## Publications

Locke W, Sybrandt J, Redmond L, Safo I, Atamturktur S. Using drive-by health monitoring to detect bridge damage considering environmental and operational effects. *Journal of Sound and Vibration*. 2020 Mar 3;468:115088.

## Presentations

Locke W. Experimental Evaluation of Drive-by Health Monitoring on a Short Span Bridge Using OMA Techniques. Oral presentation, IMAC-XXXIX, Virtual, 2021.

Locke W. Techniques for Simulating Frozen Bearing Damage in Bridge Structures for the Purpose of Drive-by Health Monitoring. Oral presentation, IMAC-XXXVIII, Houston, TX, 2020.

Locke R, Kupis S. Applying Uncertainty Quantification to Structural Systems: Parameter Reduction for Evaluating Model Complexity. Oral presentation, IMAC-XXXVII, Orlando, FL, 2019.

West BM, Locke WR, Andrews TC. Applying Concepts of Complexity to Structural Health Monitoring. Oral Presentation, IMAC-XXXVI, Orlando, FL, 2018.