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A Portable Toolkit for Testing Bridge Structural Integrity

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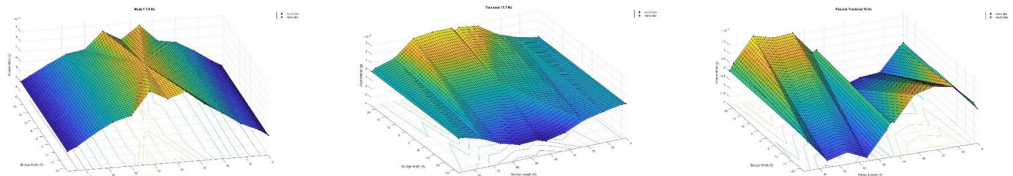
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The frequencies associated with each of these plots are 7.80 Hz, 11.70 Hz, and 15.00 Hz, respectively. For more detail, download the final report.

A PORTABLE TOOLKIT FOR TESTING BRIDGE STRUCTURAL INTEGRITY

The most expensive and critical links in the nation’s transportation network are its bridges. Historical and contemporary bridge failures have highlighted our reliance on these structures. While the nation’s bridge management system is robust and well administered, the tools needed to evaluate individual bridges to determine their condition—whether for asset management or in response to a significant loading event such as the imminent Cascadia Subduction Zone earthquake in the Pacific Northwest—are currently highly specialized.

The goal of this study was to develop a cost-effective, accurate, and easily deployed evaluation tool using widely available mobile technology (specifically iPods) to measure the dynamic structural response of a bridge subjected to harmonic forcing. Researchers leveraged principles of structural mechanics, dynamics, and vibrations, as well as a significant body of literature, to conceive a system that could complement existing visual inspection methods to support bridge condition evaluation and rating.

The outcome of the project is the **Rapidly Deployable Structural Evaluation Toolkit for Global Observation**, or **RDSETGO**.

It consists of a portable electromechanical shaker that supplies a harmonic force to a structure, and a network of iPods to measure acceleration response, all contained in easily transportable plastic totes. The system has been determined to be robust, forgiving, accurate, and relatively easy to use. As a result of this work, the RDSETGO system is sufficiently developed to incorporate additional refinements, to support a more systematic study of bridge dynamic performance, and to be considered for regular deployment by bridge inspection personnel.



Researchers at the Oregon Institute of Technology used widely available mobile technology to develop a portable, easy-to-use structural evaluation toolkit that can measure condition changes in bridges and other transportation structures.

PROJECT TITLE
Rapid Transportation Structure Evaluation Toolkit (#2017-1022)

INVESTIGATOR
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<http://nitc.trec.pdx.edu/research/project/1022>

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