UTC Project Information	
Project Title	Deployment and Validation of Low-Cost Wireless Sensors for Real-Time Lifeline Condition of Assessment
University	Oregon State University
Principal Investigator	Daniel Borello
PI Contact Information	Daniel.borello@oregonstate.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	University of Washington PacTrans $20,000 Oregon State University $20,000
Total Project Cost	$40,000
Agency ID or Contract Number	DTRT13-G-UTC40
Start and End Dates	September 16, 2015– June 15, 2017
Brief Description of Research Project	As bridges in the United States age and begin to show signs of fatigue, monitoring and inspection is becoming increasingly important. Many interstate highway bridges were built in the 1950's or earlier and are at the end of their original design lives. Over 500 bridges partially or totally collapsed in the United States between 1989 and 2000 due to various triggering events (Zhou 2013). The Pacific Northwest is at risk for significant seismic and tsunami events, which are capable of severely damaging the lifeline transportation infrastructure, particularly bridges. Deployment of wireless sensors on transportation lifeline infrastructure would enable rapid evaluation of the condition and effective deployment of first responders and increasing the community resilience and safety of the transportation network. In ongoing phase one of this work, "Deployment of Low-Cost Wireless Sensors for Real-Time Lifeline Condition Assessment", a sensor was developed to assess the condition of bridges following a natural hazard.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	Numerical models of eight prototype bridges typical to the region were developed using the OpenSees FEA package. The numerical models were subject to a suite of ground motions to simulate the demands anticipated in the Pacific Northwest. The damage state of the bridges were compared to metrics measurable using wireless bridge sensors. Recommendations were developed permitting wireless sensor data to be related to bridge performance. While the technology for structural health monitoring is becoming increasingly advanced, there remains the need for a framework to make decisions based on the data obtained. The data from these sensors should be used to instruct bridge inspection and maintenance.
Impacts/Benefits of Implementation (actual, or anticipated)	The results of this work will bring the sensor developed in phase one closer to widespread deployment. The Arduino based sensor will be packaged for long-term outdoor deployment. Monitoring during the deployment will identify key areas for improvements and validate the sensor for real-world use. This sensor will provide the structural health monitoring community with an open platform that can be widely deployed. Installation materials provided will demystify the deployment procedure and serve as training materials for installers.
Web Links • Reports • Project Website	Final Report: http://hdl.handle.net/1773/43525