UTC Project Information	
Project Title	Development of Low-Cost Wireless Sensors for Real-Time Lifeline Condition Assessment
University	Oregon State University
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Funding Source(s) and Amounts Provided (by each agency or organization)	University of Washington PacTrans $19,993 Oregon State University $19,993
Total Project Cost	$39,986
Agency ID or Contract Number	DTRT13-G-UTC40
Start and End Dates	January 15, 2015– September 16, 2016
Brief Description of Research Project	The transportation network is a critical lifeline to community resilience following a major natural disaster. In the Pacific Northwest, consideration of seismic demands on bridge designs is a relatively recent development in the last 20 years. A significant portion of the bridge inventory is expected to suffer failure due to a large event, such as a fault along the Cascadia subduction zone. Rapid assessment of the bridge infrastructure is critical in getting key personnel to where they are needed. Therefore, a real-time lifeline monitoring system can provide a significant improvement in community response during the most important hours following an event. There are several platforms widely available that will serve as the foundation for a low-cost wireless sensor for the assessment of lifeline condition. For example, the Arduino project aims to provide a low-cost platform, with moderate computational capabilities, that can be powered indefinitely with a battery and solar panel for less than $25 (Thompson 2008). The objectives of this research are to develop a sensor that can assess local member demands utilizing strain gages, and wirelessly transmit these measurements to other nodes on the same structure. The sensor will be built using an off-the-shelf platform. The data acquisition, computation, wireless communication capabilities will be optimized with respect to power consumption and deployment cost.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	Several wireless sensor platforms were explored. The Intel Edison platform was selected for its low cost, and wide compatibility. The wireless infrastructure was developed and several sensors were purchased, and the foundation for inter-node communication was written. Power consumption measurements were made to determine the feasibility of long-term deployment. A suite of bridges were selected and analyzed. The results of these analyses will be used to inform collapse modeling.
Impacts/Benefits of Implementation (actual, or anticipated)	The research resulted in the development of a wireless sensor that is ready for deployment. This project received additional funding in the form of Phase II for a project to explore deployment options for the sensor. This research was also part of program to prepare underrepresented minorities for successful careers in engineering. A promising female structural engineering graduate student, Kelli Slaven, worked integrally with the PI on this project. Her work was part of a showcase to undergraduate women in order to recruit additional researchers and encourage their participation in STEM fields.
Web Links • Reports • Project Website	http://hdl.handle.net/1773/43498