TIDC Transportation Infrastructure Durability Center AT THE UNIVERSITY OF MAINE

Wireless Joint Monitoring System (w-JMS) for Safety of Highway Bridges

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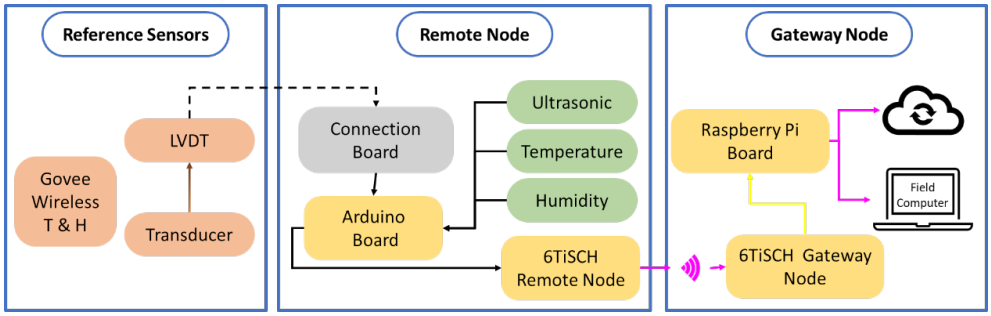
Abstract

Maintaining the safety and stability of a bridge is a series concern of our nation. ASCE report cards repeatedly give low grades for our bridges indicating the immediate needs for repair and maintenance. The bridges' expansion joints of our regions are especially vulnerable because of continuous thermal expansions and shrinkage under the severe weather situation in New England. Although major bridges are visually inspected every two years to check their conditions, that method is often time consuming, costly, and fails to provide the necessary information if not inspected in the time frame. To assist timely maintenance and increase structures' life span, a low-cost continuous monitoring system is desired. Recent joint monitoring efforts have been implemented around the world, in countries such as Portugal and China. In Europe and Asia, many studies of temperature and thermal effects have been conducted on highways, suspension bridges, and cable-stayed bridges. Despite these applications, there are limited studies of joint monitoring in the United States, where the temperature fluctuates drastically from coast to coast. Thus, this work discusses the needs of the bridges in the Northeastern United States, by presenting the current joint monitoring practices adopted by the six Department of Transportations in the United States as a technical survey. Additionally, the progress towards the development of a long-term monitoring system for expansion joints is presented. The proposed project will provide comprehensive structural health monitoring framework using commercial wireless sensors networks that can be readily deployed in the field structures for real-time damage alert to the bridge owners. The eventual vision of the project is to increase the service life of our bridges by timely maintenance by real-time continuous monitoring.



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