



## Scour Monitoring at Bridge Sites using Wireless Smart Scour Sensing Posts

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### **ABSTRACT**

Scour is a major concern for bridge owners as the primary historical cause of bridge collapse in the US. Manual inspection for scour is a valuable tool to manage scour risk, but budgetary constraints limit the number of visits that can be made to bridge sites, typically to one per year. A permanent monitoring system can provide daily scour measurements, create alerts, and reduce the public's exposure to scour-related bridge collapses. In this study, a new scour monitoring system based on modular, wireless smart scour sensing posts is presented. The posts are equipped with an array of magnetic and magnetostrictive whisker sensors that can detect the absence of riverbed material by measuring current-induced vibrations in the whisker themselves when no longer trapped by sediment. An embedded wireless sensor device interrogates raw sensor data and sends processed results to a local cellular-enabled base station that aggregates scour measurements from multiple posts placed around the bridge. Those aggregated results are then transmitted to the remote bridge owner and may be used to improve hydrological models of the bridge site. In addition, alert conditions may be specified by the bridge owner based on the location and depth of scour observed by the system. This paper presents the details of the integrated system as well as results from an ongoing field study.

**KEYWORDS:** *scour monitoring,  
wireless sensing,  
embedded systems,  
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