

SENSOR CHARACTERIZATION FOR
LONG-TERM REMOTE MONITORING
OF BRIDGE PIERS

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ABSTRACT

Structural instability of bridge piers resulting from scour or other natural hazards can lead to bridge collapse. A monitoring system that analyzes bridge pier behavior could prevent this type of failure by detecting conditions, such as pier tilt, that may lead to instability. The sensor system developed during this project consists of an array of low cost tilt sensors, deployed on both the pier and superstructure of a bridge, to monitor structural behavior of a bridge pier. The goal of the research presented in this thesis is to characterize the behavior of the sensors that are to be used in this system.

Characterization of the sensors required analysis of several distinct sensor attributes that can often be specific to individual sensors. For example, this analysis included sensor calibration, drift analysis, characterization of temperature effects, in-situ sensor behavior, and characterization of the sensor system's resolution.

This thesis will describe the process of designing test systems required to complete the sensor characterization. The experiments performed to characterize the sensors using these test systems will be defined. Finally, the results of the testing conducted to characterize sensor behavior, and the implications of sensor characteristics on the final system's operational capability will be discussed.