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Development of Reliable and Low-Power Wireless Health Monitoring Systems for Highway Bridges

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This paper provides a summary of ongoing research sponsored by the National Institute of Standards and Technology (NIST) that seeks to improve inspection practices for steel bridges by providing the technology and methodology for real-time monitoring. In order to reduce the time and cost of installing a traditional monitoring system, the research team is investigating the use of wireless communications within the sensor network. To date, the research has included the investigation of both IEEE 802.11 and IEEE 802.15.4 wireless communications, identifying the latter as more practical for bridge monitoring applications. Studies were conducted to characterize the performance of wireless communications in various bridge types.

The paper also describes the development of a low-power wireless strain data acquisition device. The intended bridge monitoring requires the continuous, non-stop and reliable capture of live load data, while minimizing power consumption. An intelligent wireless sensor node that can be programmed, using LabVIEW graphical programming technology, to process and reduce the strain data in real-time has been prototyped and is being tested on a highway bridge in Austin, TX. The engineering challenges faced in trading off power consumption with performance for strain gage measurements is discussed.

Ключевые слова:

Содержание.

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