

WIRELESS STRUCTURAL MONITORING

Abstract

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This paper will address the development of technology for comprehensive and cost-effective solutions for structural monitoring of civil assets – bridges, large facilities, new construction, dams, and commercial buildings - aimed at identifying the onset, development, location, and severity of structural vulnerability and damage. The technology concept is based on a wireless network of “intelligent” devices, or *sensing units*, for capturing damage information and a decision support software for information presentation, analysis and dissemination. Each sensing unit has the capability to: (a) interface (internally and externally) to multiple sensors for capturing structural and environmental data; (b) be part of a *wireless mesh network* by communicating to other units and a base station; (c) process sensor measurement data through embedded algorithms, thereby converting raw sensor data into useful information; (d) store collected data and processed information in the unit itself; (e) transmit data and processed information to the base station and other units. Sensing units are compact in size and easy to install. Major functions and outputs of the decision support software include: *interface* to the wireless network through command and control messages; *web services* so that information can be accessed by desktops, laptops and hand-held devices via the Internet and other networks; *system status* indicators on the operational state of sensing units, the condition of sensors and the state of wireless communications; and *monitoring data* in terms of alerts, damage assessments and corresponding recommendations for action.