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Wireless technologies for the monitoring of strategic civil infrastructures: an ambient vibration test of the Faith Bridge, Istanbul, Turkey

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Rapid improvements in telemetry technology and the general decrease in communication costs have raised a growing interest in low-cost wireless sensing units. This is especially the case for structural monitoring purposes, where they are becoming a more valuable alternative to conventional wired monitoring system. The main advantages associated with the use of wireless sensing unit include a considerable decrease in installation costs, decentralization of data analysis, and the possibility of broadening the functional capabilities by exploiting the use, at the same time and place, of different sensors. In this work, the design of a low-cost wireless sensing unit able both to collect, analyze, store, and communicate data and estimated parameters is presented. The suitability of a network of these low-cost wireless instruments for monitoring the vibration characteristics and dynamic properties of strategic civil infrastructures is validated during a ambient vibration recording field test on the Fatih Sultan Mehmet Bridge in Istanbul, Turkey.