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Wireless Sensor Networks for Seismic Evaluation of Concrete Buildings

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Rapid advances in computation, sensing and data transmission techniques, such as RFID technology, Micro-Electro-Mechanical Systems (MEMS) and low power wireless networking, offer hope of a new generation of small and inexpensive networked sensors. These can be distributed in buildings and structures to provide accurate quantitative information on the physical state of the structure while in service. The EU-funded MEMSCON project aims to develop MEMS-based sensors for structural monitoring and to integrate these sensors with a Decision Support System that will use the information from the sensors to evaluate reinforced concrete buildings. This both before and after earthquakes, to aid decisions on improvement and repair. Although today the appraisal of seismic damage is almost exclusively based on visual inspection, measuring quantitatively the response of buildings during and after an earthquake, in terms of acceleration and strain, is a very task. However structure owners are somehow reluctant to install permanent sensing systems, due both to their high costs and to the difficulty of interpreting the data. To overcome these limitations, the MEMCON project aims to produce a small size sensing node, integrating MEMS-based sensors and an RFID tag in a single package. Such nodes can then be attached to reinforced concrete buildings for life-cycle measurements of acceleration and strain, with data transmitted to a remote base station using a wireless interface. These nodes will allow economically sustainable industrial deployment of structural monitoring systems. This paper presents the development of the first prototypes of strain and acceleration sensors, and their validation in the laboratory.

Ключевые слова:

Содержание.

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