Embedding IEEE 1451.4 smart sensing nodes in a Wireless Air Quality Monitoring Network

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Abstract:
An hybrid smart sensor network that includes a set of sensing nodes designed and implemented according with the specifications of the Smart Transducer Interface Standard, IEEE 1451, is presented. The communication between the nodes and the host computer that is used for advanced air quality data processing and data storage is performed through a wireless connection that was developed using a low cost, high performance radio device. Regarding the IEEE 1451 implementation the nodes put together a minimal Dot4 Network Capable Application Processor (NCAP) with a data acquisition unit that reads the analog signals from an IEEE 1451.4 Transducer Unit with air quality, temperature and relative humidity sensors using a Mixed-Mode Interface (MMI). The LabVIEW program implemented on the computer performs the automatic identification of the node analog sensors through TEDS reading, air quality data correction using the temperature and relative humidity information, data logging and pollution alarm generation. The use of Virtual TEDS solution for the sensing nodes is also considered.

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Contents

Indoor air quality (IAQ) has become one of the most urgent environmental issues of our time. The environment agencies estimate that more that 30 percent of the persons working in commercial buildings suffer from bad air. The studies warn that the levels of indoor air pollutants may be two to five times higher than outdoor levels. New actions are taken to improve air quality, like monitor IAQ levels and keep accurate records of their progress.