Design of Noise Measurement Wireless Sensor Network: Sensor Node design and Networking design

In this project a wireless sensor network (WSN) application is developed and the aim of this project is to improve the efficiency and convenience of environmental noise monitoring in both industrial and residential areas while greatly reducing the cost.

The project is carried out by sensor hardware design in the beginning and we later focus on the networking and communication design excessively. The whole network is built on Cinet platform in which the hardware consists of ATmega128 microcontroller and TI's cc2420 IEEE 802.15.4 compatible RF module, and the protocol stack is a cross-layer architecture built on IEEE 802.15.4 standard MAC protocol.

The sensor function design includes following issues:

1. A-weighting filter design
2. Using ATmega128 10-bit ADC to cope with 60-dB more dynamic range of the Sound level
3. Timing of sensing
4. Calibration and power consumption
5. Testing

The networking and communication design includes following issues:

1. global synchronization
2. Routing to the SINK
3. Minimizing the use of radio channel
4. Transmission scheduling
5. Invoking of relay nodes

The target network can be deployed as a multihop system so that a relatively large area can be covered. We have tested the network in Kokkola, Finland for both road traffic noise and summer-camp concert noise.

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