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New technology offers low cost noise monitoring

Networks of wireless sensors could be used to monitor traffic noise. A new study shows that the wifi sensor systems, although slightly less accurate than precision noise monitoring systems, can provide detailed information, with dense coverage, about traffic noise over a longer period. Their low cost and low energy requirements make them particularly suitable and attractive for use by local authorities or even community groups.

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Contact:
margaret.bell@ncl.ac.uk, fabio.galatioto@ncl.ac.uk

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Traffic noise has been shown to be harmful to human health by disturbing sleep and contributing to cardiovascular problems. Its effects depend on level and pitch. Around half of the EU population is exposed to traffic noise and the Environmental Noise Directive (END) aims to prevent or reduce its harmful effects[1].

To achieve the aims of the END and develop noise action plans, noise monitoring could be very helpful. The new study demonstrates that it is possible for local authorities to acquire noise data inexpensively using new, low power, wireless technology based on a network of sensors called 'motes'.

Motes originally developed for both air quality and noise monitoring purposes were used to collect noise data in Leicester, UK, and Palermo, Italy. Motes can incorporate GPS sensors so their position can be tracked and can be static or dynamic. Dynamic motes, for instance, can be used to measure a cyclist's personal exposure to noise. The commercial motes are equipped with a solar-powered and two back up batteries, which together increase their potential lifespan from months to years.

Data from two motes at the side of a busy road in Palermo were compared to data collected using a precision noise monitor. The mote closest to the road was positioned next to the noise monitor and the other was positioned one metre away, with a third sensor used to check that measurements at this distance were similar. Although the researchers suspected their system would not be able to measure noise as accurately as a more expensive system, measurements were consistent and shown to be able to measure noise differences of less than 1dBA.

Next, data from a Leicester network of 50 sensors showed that noise levels varied minute by minute, ranging from 54-74 dBA in the locations sampled. The researchers were able to detect transients in traffic noise associated with traffic signals, traffic calming and bus stops. The measurements were less accurate than if a precision monitor had been used, but the researchers claim they were able to identify similar noise trends to those seen in previous studies and that longer, simultaneous monitoring has revealed greater variation in noise levels.

The study suggests that the new technology offers greater coverage (up to 100 sensors per km^2) in noise monitoring at lower cost. According to the researchers, the technology is easily put into use and could allow local authorities to assess the impact of noise action plans and public perceptions of changes in urban noise.

1. See: http://ec.europa.eu/environment/noise/directive.htm