

Method for in situ acoustic calibration of smartphone-based sound measurement applications

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Participatory measurement of environmental sound levels has gained interest in recent years. The calibration of measuring instruments is currently the main technical limitation. It is often the responsibility of the users and can be a potential source of error or add costs to the measurement protocol. In this article, a calibration protocol is proposed, based on the low variability of the average noise emission of individual vehicles. The advantage of this protocol for the user is that it does not require specific equipment, i.e. reference sound source or device, or special knowledge in acoustics. The method consists in measuring the noise level of a few vehicles as they pass through at different measuring points. The measured levels are compared to the levels expected by a numerical model, the difference serving as an offset for subsequent measurements. The robustness of the protocol is first tested over a large experimental campaign, and it turns out that measuring the passage of 15 vehicles at 3 different locations limits the error to $\pm 1.8 \pm 1.0$ dB(A). Then, the protocol is tested in real conditions with a set of 8 smartphones. The comparison with a class 1 sound level meter on 6 control points shows an average error on all phones of $\pm 0.6 \pm 1.2$ dB(A). © 2020 Elsevier Ltd

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