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Title:

Psychoacoustic analyses of the road traffic noise predicted for 2020

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Abstract:

Electric motors will continuously replace combustion engines within the next decades, although conventional drives will remain in use for a longer period. The expected increase of quiet vehicles results in new opportunities regarding a substantial reduction of road traffic noise in urban contexts in combination with an optimized composition of future urban soundscapes. However, in order to fully utilize the noise reduction potential, holistic noise and vibration abatement approaches must be applied addressing issues like tire-road noise, vehicle-type-oriented access concepts, psychoacoustic analyses, infrastructures as well as comprehensive emission considerations and soundscape concepts. The European research project CityHush deals with these topics and will propose step-change solutions to substantially reduce noise in city environments. One major issue concerns the detailed acoustical analyses and psychoacoustic evaluations of hybrid and electric vehicles under various running conditions, beyond simple sound pressure level considerations. Moreover, by using extensive measurement data a traffic noise synthesizer for the generation of pass-by noise of quiet vehicles as well as complete traffic scenarios with different vehicle types and numbers is developed. The synthesis tool allows not only for calculating acoustical indicators of virtual traffic scenarios but also for the binaural auralization of the resulting noises. Measurement data, results of acoustical analyses as well as vehicle exterior noise simulations of hybrid electric vehicles will be shown and compared to exterior noise of vehicles equipped with combustion engines. Further, the manifold possibilities of the traffic noise synthesizer with regard to urban planning and the design of soundscapes will be discussed.

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