Title
Visualization of sound sources in real time: microphone array processing beyond the state of the art

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Abstract
Microphone arrays used in industrial contexts are mainly designed for a fast setup and basic evaluation (e.g. using delay-and-sum beamforming). The resulting restrictions are mainly a limited dynamic range and the limitation to free field environments. Although a wide range of algorithms for advanced evaluation has been developed, only a few of them are integrated in industrial systems. This is mainly due to the fact that these algorithms require considerably longer computation time, expert knowledge and the integration of additional hardware. This paper presents techniques for real-time processing of microphone array data including multiband beamforming, coherence/incoherence filtering using additional sensors, e.g. accelerometers, laser vibrometers, artificial heads, and the integration of measured source characteristics for the application in strongly reverberant environments. The real-time processing offers the possibility of interacting with the interesting source and visualizing online the effect of a modification. Combining the microphone array with the signals of multiple video cameras allows for detecting the distance between the array and a threedimensional source distribution, resulting in a higher accuracy of the localisation and quantification. The benefits of the described techniques are illustrated with measurements on a vehicle drive train.