

Acoustically transparent sound presentation in hearing devices: Algorithms, devices and models

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Abstract

Assistive hearing devices often have a low user acceptance due to a limited sound quality. Recently, the concept of acoustic transparency was proposed to increase the sound quality for hearing-impaired and normal-hearing users. Acoustic transparency of a hearing device refers to the acoustic perception of an open ear canal while the device is inserted in the ear. This can be achieved by applying an equalization filter to the output of the device such that the transmission properties of the open ear are obtained [1, 2]. In this contribution we give an overview of our approach to acoustically transparent sound presentation. We present recent advances in our custom earpiece design with multiple receivers and microphones [1, 3] as well as signal processing algorithms for robust acoustic feedback suppression [4] and sound pressure equalization [1, 4, 5, 6]. We present results from subjective evaluations of a real-time demonstrator in terms of the overall quality compared to the open ear [7] and outline future research directions, e.g., using individualized electro-acoustic models to alleviate the necessity of measuring the acoustic transfer functions within the device and to the eardrum [8].

Keywords: Acoustic Transparency, Feedback Cancellation, Sound Pressure Equalization

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