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Editorial

Sound Environments

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Received: 6 November 2020; Accepted: 9 November 2020; Published: 11 November 2020

Sound environment is a vital part of our overall environment [1]. The EU Green Paper on Future Noise Policy indicates that 80 million EU citizens are suffering from unacceptable environmental noise levels according to the WHO's recommendation; the social cost of transport noise is 0.2–2% of total GDP and the EU Environment Noise Directive (END) required a series of actions [2]. The situations in other developing countries are even more severe. In the last decade or so, there have been many major new developments in the field of sound environment, both in terms of research and practice [3]. Various prediction methods for sound propagation in micro- and meso-scale urban areas have been explored, and large-scale noise-mapping software packages have been developed and applied extensively in practice with the advancement of computing resources. There have been a number of new noise control measures and design methods. Sound environments have also been examined from the subjective perspective, with multidisciplinary approaches, and the importance of soundscape and overall sound environment design has been widely recognised, which is a further major step from simply reducing urban noise level [4,5]. In environmental policies and regulations, noise problems have also been paid increasing attention at various levels [6].

This Special Issue on 'Sound Environments' presents some aspects of the state-of-the-art development in our sound environment, ranging from soundscape research, noise exposure of schools, urban tranquillity prediction, to sound environment in car cabins; from fundamental research, practice-oriented approaches, to the exploration of research impact and outreach.

Marchegiani et al. explored speech identification and comprehension in the urban soundscape [7]. Listening experiments were performed to evaluate the ability of individuals with normal hearing to detect words and interpret conversational speech in the presence of urban noise. It was confirmed that speech identification is influenced by the similarity between the target speech and the masking noise in urban scenarios. In other words, speech identification is more successful in the presence of noise with tempo-spectral characteristics different from speech. Consequently, the use of the structural similarity index was proposed to quantify this similarity. Overall, the experiments demonstrated that speech comprehension can be fairly successful, even in acoustic scenes where the ability to identify speech is highly reduced.

Soeta and Sakamoto carried out an exploratory analysis of sound field characteristics using the impulse response in a car cabin [8], considering the tendency that sound environments in cars are becoming quieter and receiving attention because of the prevalence of low-noise engines, such as hybrid and electric engines, and the manifestation of automated driving. Effects of the passenger position, open windows, and the use of an air conditioner on acoustic parameters were systematically demonstrated, considering a series of acoustic indices including sound strength at low frequencies, interaural correlation, and the ratio of early- and late-arriving energy at high frequencies.

Secchi et al. developed a method to estimate students' exposure to road traffic noise events [9] from data available on noise maps by the municipalities of metropolitan areas, using regression equations obtained between L_{Aeq} and A-weighted maximum and statistical levels due to road traffic noise. The traffic noise of 28 urban streets was monitored during the opening period of Italian schools.

It is interesting to note that a case study in Florence using this method showed that almost 60% of students from municipal primary and lower secondary schools could be exposed to a maximum sound pressure level (SPL) inside the classroom greater than 55 dB(A) every hour, probably exceeding the typical background noise in classrooms by more than 10 dB.

Cassina et al. examined audiovisual preferences and tranquillity ratings in urban areas [10]. Based on a survey related to the acoustic and visual perception of 614 users of urban areas in Pisa (Italy), a linear model that predicts the tranquillity perceived in different environments was proposed, based on their visual and acoustic characteristics. It was found that the perceived tranquillity results negatively correlate to L_{A10} and to the presence of sound sources or negative visual elements. The presence of beneficial sound sources is positively correlated to the perceived tranquillity, and the effect of the noise level is regulated by environmental characteristics.

Aletta and Kang reviewed and explored the impact and outreach of soundscape research [11], given that soundscape has been growing steadily as a research field since its interdisciplinary concepts were first introduced about 50 years ago, and it currently affects a broad spectrum of disciplines ranging from social sciences to urban planning and noise control engineering. Aiming at exploring how soundscape research is received by the community, the Altmetric database was used to map how and where soundscape research is "mentioned", considering the number of mentions over time, their geographical spread, and the effectiveness of publication outlets. It was shown that mentions are growing with time, they mostly originate in the United States and the United Kingdom, and they are generated by a limited number of research items.

Vogiatzis and Rémy discussed a guide based on selected case studies of Strategic Noise Maps (SNM) and Noise Action Plans (NAP) in medium and large urban areas, relating to changing the urban sound environment in Greece [12]. As a practice-oriented approach, this paper shows how environmental noise data are cross-analysed with urban and architectural data and perception descriptors by inhabitants. It has also been shown how these specific results were implemented in the developed noise actions plans that have been proposed to the authorities for immediate implementation. Necessary developments to reduce noise exposure problems were also discussed, as well as how to assist cities in their evolution toward the introduction of a sustainable urban sound environment.

Funding: This work received funding through the European Research Council (ERC) Advanced Grant (No. 740696) on "Soundscape Indices" (SSID).

Conflicts of Interest: The author declares no conflict of interest.

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