

Acoustics Section (AKI).

INVITED PAPER:

„Network of Microphone Arrays for Localization and Classification of Biological and Anthropogenic Sound Events“

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Abstract: The sound field is inherently complex, as at any given observation point, the sound pressure signal represents the cumulative effect of all sound waves originating from various sources and reflections from multiple directions. Measuring sound at a selected location thus provides a composite insight into the total sound pressure value, encompassing contributions from diverse sources and directions. This article presents two methods for creating an audio event map. The first method relies on localizing sound events within the direction perception time scale (125 msec) and spatially averaging these localizations, while the second method focuses on the directivity of the sound immission, measured concurrently with the equivalent noise level. By analyzing the directivity of immission at various points around the area of interest, we can transform it into a noise map using a straightforward algorithm. The direction detection algorithm, a differential microphone array with subwindows, is implementable on FPGA hardware, enabling the assignment of directions to sound events. Concurrently, at the microphone array, audio signal characteristics are analyzed, filtering the data to essential elements for transmission to a server where unsupervised classification calculations are performed. This classification then facilitates the categorization of sound events into distinct classes, such as identified noise sources, crickets, birds, traffic, and other human activities.

Short Bio:



Jurij Prezelj is an Associate Professor at the University of Ljubljana, Faculty of Mechanical Engineering, Ljubljana, Slovenia. He received his M.Sc. and Ph.D. degrees from the University of Ljubljana in 2003 and 2006, respectively. He is also with the Slovenian accreditation, Ljubljana, Slovenia, as a Technical assessor for sound and vibration, and with the B4Ssound d.o.o., as founder and procurator. Since 2016 he has been head of the Laboratory for Technical Acoustics.

He is the author/co-author of 64 scientific papers in peer review journals with impact factor, more than 120 scientific articles presented at international congresses/conferences, one University grade book “Vibrations and Sound for Maintenance”, one granted patent for “System for Automatic Noise Source Identification and Classification”, and more than 97 different industry project and industry measurement reports.