

Acoustics section (AKI)

INVITED PAPER:

“System Aspects of Direct Localization of Multiple Acoustic Sources Using Distributed Sensor Networks”

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Abstract: When commonly used two-step localization techniques, such as TOA/TDOA, DOA or RSSI/Fingerprint-based, are applied to localization in multiple signal scenarios, there is a so called association problem. This problem is complex and complicated to solve. Data association problem is referred to grouping of localization parameters for a set of sensors (TOAs, TDOAs, DOAs, RSSI/Fingerprints) into subsets, each corresponding to a single source. With single-step (or direct) localization techniques, that problem does not exist. One-step localization techniques are of more recent date, they are numerically more demanding and complex than the two-step ones, and are used less frequently than two-step methods. But they significantly outperform two-step techniques in terms of localization accuracy and resolution properties. A comparative study of direct localization of acoustic signal sources and radio signal sources using distributed sensor networks, from the perspective of generic system models, generic signal models, direct localization methods, and theoretical CRB limits of location estimation error is presented. Two case studies of applying direct localization of acoustic signal sources in indoor environments will be demonstrated, namely the detection of two moving e-Puck educational mobile mini-robots and the detection of an acoustic signal source using a functional model of an acoustic camera. Theoretical CRB limits of error estimation will be provided for the mentioned system models.

Short biography:



Miljko Erić received a Ph.D. degree in telecommunications from the Faculty of Technical Science, University of Novi Sad, Serbia. He was a Professor at the University of Belgrade - School of Electrical Engineering, at master's and doctoral studies in the field of array processing of radio, radar, and acoustic signals. He was also with the Vlatacom Institute, Belgrade, Serbia. He has been a participant and project leader in numerous research and development projects related to the application of array signal processing in radio-frequency spectrum monitoring systems, systems for acoustic battlefield monitoring, etc. His current research interests include direct coherent localization methods, direction finding, high-resolution methods in FMCW radars, etc.