

Public Abstract

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Title:ADAPTIVE ARRAY SIGNAL PROCESSING USING THE CONCENTRIC RING ARRAY AND THE SPHERICAL ARRAY

The deployment of video cameras in public areas is known to be a crime deterrent. In some cases the quantity of deployed cameras is large and all of them have to be monitored at the same time by the guard on duty, by watching a wall filled with several video screens. Sometimes it is hard to know where the action is happening because the large quantity of screens and because there is not acoustic information from the video recordings. The use of acoustic arrays of sensors arranged in circular or spherical arrays could help the detection of where the action is coming from and guide the attention of the guard to the correct video screen. This thesis introduces new methods for partial adaptive beamforming for acoustic signals on an partially known interference environment. The prior knowledge of some of the interferences is used to improve the beamformer performance and obtain a cleaner signal of interest for later classification. We also introduce a broadband spherical beamformer and two robust methods against sensor position errors. We obtained increased performance with respect previous designs, faster response times and robustness against uncertainties about the direction of the interferences and also from sensor position errors. The current work about array processing and beamforming has, as a final objective, the design and implementation of these type of systems on public areas that would help in the prevention of crimes and increasing the level of confidence of the people.