

# **On the Performance of L- and V-Shaped Arrays of Cardioid Microphones for Direction Finding**

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Abstract:

The L-shaped and V-shaped arrays of first-order cardioid microphones for direction finding are presented in this paper. A comparative study of the direction of arrival estimation performance of the arrays was carried out by analytically deriving, in closed-form, and comparing the Cramér-Rao bounds of an incident signal's direction-of-arrival (DoA) azimuth and polar angles for these arrays. The maximum-likelihood estimator is used to verify the correctness of derived bounds. This investigation reveals that for direction finding, the L-shaped array of cardioid microphones would generally outperform the V-shaped array of cardioid microphones in more sub-regions of the DoA polar-azimuth angle space. However, in regions where the V-shaped array of cardioid microphones outperforms the L-shaped array of cardioid microphone, the variance ratios are usually higher in favor of the V-shaped array.

Keywords: Sensor arrays, Microphone arrays, Manifolds, Legged locomotion