Abstract

This paper proposes a model for estimating the direction of arrival (DOA) of a signal source impinging on a Uniform Linear Array (ULA). An algorithm which uses this model for estimating the delay of the signal received at two separated sensors, in a system identification perspective has been developed and its performance is compared with the results obtained through beam forming using conventional and Minimum Variance Distortionless Response (MVDR) methods. The unknown parameter, which is the phase delay at the sensors, as a result of the target presence at any bearing is estimated using the proposed method. The phase delayed signals at any sensor is generated by interpolating the samples from the previous sensor. The interpolation coefficients are estimated by considering them as part of the state vector of an Extended Kalman Filter (EKF). The EKF is used to recursively estimate the interpolation coefficients and thereby the delay. Simulation results demonstrate the feasibility of the model and the algorithm in estimating DOA both for narrowband and broadband signals. The mean of the estimates shows a reasonable degree of convergence to the true value. The variance of the estimate of the proposed method is less than that of the conventional method and very close to the MVDR method. Further it has been found that the proposed method exhibits a faster convergence.
Reference

- S. Haykin and A. Steinhardt, 1992 Adaptive Radar Detection and Estimation, John Wiley and Sons,
Index Terms

Computer Science  Signal Processing

Key words

Modeling  Direction of arrival

Estimation

Extended Kalman Filter

Minimum Variance Distortionless Receiver