

Information Theoretic Approach for Beamforming in Wireless Communications

Authors : Syed Khurram Mahmud, Athar Naveed, Shoaib Arif

Abstract : Beamforming is a signal processing technique extensively utilized in wireless communications and radars for desired signal intensification and interference signal minimization through spatial selectivity. In this paper, we present a method for calculation of optimal weight vectors for smart antenna array, to achieve a directive pattern during transmission and selective reception in interference prone environment. In proposed scheme, Mutual Information (MI) extrema are evaluated through an energy constrained objective function, which is based on a-priori information of interference source and desired array factor. Signal to Interference plus Noise Ratio (SINR) performance is evaluated for both transmission and reception. In our scheme, MI is presented as an index to identify trade-off between information gain, SINR, illumination time and spatial selectivity in an energy constrained optimization problem. The employed method yields lesser computational complexity, which is presented through comparative analysis with conventional methods in vogue. MI based beamforming offers enhancement of signal integrity in degraded environment while reducing computational intricacy and correlating key performance indicators.

Keywords : beamforming, interference, mutual information, wireless communications

Conference Title : ICICSP 2018 : International Conference on Information, Communications and Signal Processing

Conference Location : Dublin, Ireland

Conference Dates : July 23-24, 2018