

Tutorial 2: Localization, DOA Estimation & Beamforming: A Complete Review of Array Signal Processing.

Abstract

Direction of arrival (DOA) estimation and localization of the radiating sources using an array of sensors play very important role in many different areas such as radar, sonar, seismology, mobile communication, medical diagnostics etc. In underwater scenario it is required for monitoring of underwater systems, undersea discoveries, catastrophic prevention, environmental monitoring and at many other places.

Because of the vast application domain many researchers are contributing a lot in this area. With time the algorithms have become robust, efficient, simple and stable. Even the underlying technologies, array structures have seen a sea change. Traditional pressure sensor arrays are now being replaced by vector sensors. Sinusoidal complex signal model are being generalized to quaternion model.

In this tutorial we will go for this complete journey of evolution of these algorithms and technologies and understand recent advancements in details. We will understand the traditional algorithms, their limitations and the solution which leads to modified solution. We will also talk about the open challenges and areas of future research.