Public Abstract

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Title:EFFICIENT ESTIMATORS IN CLOSED-FORM FOR SOURCE LOCALIZATION AND SENSOR NETWORK SELF-LOCALIZATION

Passive source localization is a fundamental problem that has received great research interests for decades in many applications. Perhaps the most common approach for localization is to derive certain measurements from the received signals and then estimate the source position using the measurements. It is a non-trivial problem because the measurements are usually related to the source location in a highly non-linear manner. The performance of localization systems is mainly determined by the applied localization techniques. Thus, novel and efficient localization techniques have to be designed to make these systems work well.

In this research, we consider two localization techniques. One is on passive source localization to locate a source at unknown position using energy measurements from a number of receivers. We also investigate the energy measurements together with time differences of arrival (TDOAs) to improve the source location estimate. The other is on sensor node localization to obtain position estimates of unknown sensor nodes in a sensor network where anchor nodes, whose positions are known accurately, are present or absent. We also study sensor refinement by deploying new unknown nodes. The inter-node measurement considered is time of arrivals (TOAs). Efficient estimators in closed-form are derived and evaluated analytically and by simulations.