

**CHENNAI – PONDICHERRY**

**Distributed Event Localization via Alternating direction Method of Multipliers**

**Abstract:**

This paper addresses the problem of distributed event localization using noisy range measurements with respect to sensors with known positions. Event localization is fundamental in many wireless sensor network applications such as homeland security, law enforcement, and environmental studies. However, most existing distributed algorithms require the target event to be within the convex hull of the deployed sensors. Based on the alternating direction method of multipliers (ADMM), we propose two scalable distributed algorithms named GS-ADMM and J-ADMM which do not require the target event to be within the convex hull of the deployed sensors. More specifically, the two algorithms can be implemented in a scenario in which the entire sensor network is divided into several clusters with cluster heads collecting measurements within each cluster and exchanging intermediate computation information to achieve localization consistency (consensus) across all clusters. This scenario is important in many applications such as homeland security and law enforcement. Simulation results confirm effectiveness of the proposed algorithms.

**Existing System:**

Existing event localization algorithms can be cast into two categories: centralized approaches and distributed approaches. Centralized approaches always gather (noisy) measurements (e.g., range measurements) obtained by all sensors to a processing center, which then estimates the event location using a certain centralized optimization algorithm. Typical centralized methods include the parallel projection method, convex relaxation plus semidefinite programming (SDP) or second-order cone programming method. However, a severe shortcoming of centralized localization algorithms is that the computation complexity at the processing center might be quite high which poses great challenges for low-cost sensor nodes with limited computational capabilities. In addition, the required communication to collect all measurements to a single central node may be problematic due to possible traffic bottleneck and severe constraints on communication ranges. Moreover, once the central node fails due to, e.g., attacks or power depletion, the entire network slips into a state of paralysis. Therefore, techniques solving the event localization problem in a distributed way are crucial for sensor network based event localization.

**Proposed System:**

The main contribution of this paper is two ADMM-based distributed event localization algorithms, i.e., GSADMM and J-ADMM. Compared with existing centralized SDP relaxation based algorithms for event localization, the two algorithms divide the computation on a central node to different clusters to avoid possible center failure and traffic bottleneck, and in the mean time, guarantee consistency of the estimates across all clusters among which only limited communications are available. Furthermore, the two algorithms take advantages of SDP relaxation to avoid the convex hull problem compared with existing projection-based algorithms. Moreover, the algorithms are proven to converge with a convergence rate of O(1=t) where t is the iteration time.