

# Entropy-based Distributed Fault-tolerant Event Boundary Detection Algorithm for Wireless Sensor Networks

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## Abstract

Wireless sensor networks observe the occurrences of concerned events by the collaboration between sensor nodes via wireless communication. Sensors are usually prone to errors due to the unstable conditions they are exposed to. The goal is to solve event boundary detection with faulty sensors (EBDF) problem which is to successfully identify the sensor nodes close to the event boundary when faulty sensors exist in wireless sensor networks. Some previous works proposed solutions based on 0/1 decision predicate for which only values 0 or 1 (true or false) are used to represent the sensing values which may ignore local variations. Others require centralized mechanism to retrieve the threshold or it may not be applied to dynamic situation efficiently. A novel distributed event boundary detection algorithm, EBD\_Entropy, using entropy is proposed which applies system entropy concept from both thermodynamics and information theory points of view. EBD\_Entropy accepts scalar values as input. It's also distributed and localized and thus is scalable. Simulation results show that EBD Entropy is effective in enhancing the performance of boundary detection and can be applied to more dynamic environments.

Keyword : event boundary detection, fault tolerance, entropy, wireless sensor networks