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Maximum Likelihood Localization in the Presence of Channel Uncertainties

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Background

Wireless sensor networks use spatially distributed sensors (nodes) to monitor physical or environmental conditions, for example, temperature, and pressure. Applications of such networks include battlefield surveillance, environmental monitoring, industrial process monitoring and control, structure and vehicle monitoring, health monitoring and passive localization and tracking. These sensors form an ad-hoc network, communicating their data to a fixed (anchor node). In applications such as military gunshot detection or environmental monitoring, or for first responder, accurate knowledge of the location of an event can be critical, and hence it is important to know the location of the sensors when analyzing the information they provide. This can be problematic in areas where multiple transmitters may be operating and potentially interfering with each other, as well as in areas where multipath interference can cause signal fading and hence makes sensor localization difficult.

Invention Description

Researchers at Arizona State University have developed a method that improves the ability to localize the position of sensors in the presence of communication channel uncertainties. The method is based on a new technique to account for fading channels.

Potential Applications

- First-responder wireless communications
- Environmental monitoring
- Battlefield surveillance and tracking
- Healthcare monitoring
- Asset tracking in commercial supply chains

Benefits and Advantages

- **Improved Performance** - Low line-of-sight (LOS) between the transmitter and the receiver.
- **Easy to implement** - The algorithm should have the same complexity as the previous methods.
- **Accurate** - improved location at low signal-to-noise ratio.