

Influence of Scalable Energy-Related Sensor Parameters on Acoustic Localization Accuracy in Wireless Sensor Swarms

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Abstract : Sensor swarms can be a cost-effective and more user-friendly alternative for location based service systems in different application like health-care. To increase the lifetime of such swarm networks, the energy consumption should be scaled to the required localization accuracy. In this paper we have investigated some parameter for energy model that couples localization accuracy to energy-related sensor parameters such as signal length, Bandwidth and sample frequency. The goal is to use the model for the localization of undetermined environmental sounds, by means of wireless acoustic sensors. We first give an overview of TDOA-based localization together with the primary sources of TDOA error (including reverberation effects, Noise). Then we show that in localization, the signal sample rate can be under the Nyquist frequency, provided that enough frequency components remain present in the undersampled signal. The resulting localization error is comparable with that of similar localization systems.

Keywords : sensor swarms, localization, wireless sensor swarms, scalable energy

Conference Title : ICWCSN 2015 : International Conference on Wireless Communication and Sensor Networks

Conference Location : Zurich, Switzerland

Conference Dates : July 29-30, 2015