

# Energy-Efficient Distributed Signal Processing in Mobile Wireless Sensor Networks

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## Abstract

Wireless mobile sensor networks are important for a number of strategic applications such as surveillance, fire detection, outlier detection. Energy is a critical resource in wireless sensor networks and system lifetime needs to be prolonged through the use of energy-efficient signal processing during system operation. In this talk an overview of statistical prediction frameworks for tracking dynamic targets in range-based signal processing is presented. The single mobile target algorithm has been evaluated by the metrics of tracking precision and network energy consumption. The computation of the posterior Cramer-Rao bound (PCRB) for range-based target tracking has been considered. PCRB is a theoretical lower bound on the estimation error while assessing the performance of any kind of estimation algorithm. Here the method is applied to a nonlinear filtering problem of tracking node in wireless sensor networks. The evaluation is performed using the constant velocity model and the path loss propagation model, respectively, as dynamic model and measurement model. The bound is computed against the root mean square error of two non linear filters: bootstrap and unscented particle filter. A novel tradeoff between the accuracy of the estimation bound and the energy consumption is also showed.

**Loredana Arienzo** is a researcher at the Institute for the Protection and the Security of the Citizen in the Joint Research Centre of European Commission (<http://ipsc.jrc.ec.europa.eu>) since December 2008. She received her PhD in Information Engineering from the University of Salerno in 2008. Loredana Arienzo was a visiting researcher in BWN Lab, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, in 2006. She received her B.Sc. and M.Sc. degree in Electronics Engineering from the University of Salerno (IT), in 1999 and her Associate degree in Software Engineering from the University of Benevento (IT), in 2001. Her research interests focus on wireless communications, ad-hoc and sensor networks, distributed signal processing, tracking in ad-hoc and wireless sensor networks, cognitive radio networks. She is part of the European Concerted Research Action IC0902: Cognitive Radio and Networking for Cooperative Coexistence of Heterogeneous Wireless Networks. Loredana Arienzo is a member of IEEE, IEEE Communication Society and ACM. She is a reviewer for IEEE Transactions on Vehicular Technology, IEEE Communications Letters and 2010 ICST Advanced International Conference on Telecommunications.