Spatial statistical analysis for the design of indoor particle-filter-based localization mechanisms

Article (PDF Available) *in* International Journal of Distributed Sensor Networks 12(8) · August 2016 *with* 43 Reads
DOI: 10.1177/1550147716661953


1st Jesus Martínez-Gómez
16.88 · University of Castilla-La Mancha


2nd Miguel Martínez del Horno
1.28 · University of Castilla-La Mancha


3rd Manuel Castillo-Cara
4.45 · Universidad Nacional de Ingeniería (Peru)

+ 2


Last Ismael García-Varea
20.24 · University of Castilla-La Mancha

Show more authors

Abstract

The accurate localization of end-users and resources is seen as one of the main pillars toward the successful implementation of context-based applications. While current outdoor localization mechanisms fulfill most application requirements, the design of accurate indoor localization mechanisms is still an open issue. Most research efforts are focusing on the design of mechanisms making use of the receiver signal strength indications generated by WLAN (wireless local area network) devices. However, the accuracy and robustness of such mechanisms can be severely compromised due to the random and unpredictable nature of radio channels. In this article, we develop a methodology incorporating various algorithms capable of coping with the unpredictable nature of radio channels. Following a holistic approach, we start by identifying the wireless equipment parameter setting, better meeting the implementation requirements of a robust indoor localization mechanism. We then make use of RANdom SAmple Consensus paradigm: a robust model-fitting mechanism capable of smoothing the data captured during the space survey. Using an experimental setup, we evaluate the benefits of integrating the floor plan and an ordinary Kriging interpolation algorithm in the estimation process. Our main findings show that our proposal can greatly improve the quality of the information to be used in the development of particle-filter-based indoor localization mechanisms.