

Abstract

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Improved VLC-Based Indoor Positioning System Using a Regression Approach with Conventional RSS Techniques

There is a recent interest to develop an indoor positioning system using visible light communications technology. Based on received signal strength (RSS), this paper combines a simple regression-based approach with linear and nonlinear least square estimations (LLS & NLS). The performance of regression approach is evaluated by different metrics such as the average, standard deviation, and cumulative distribution function of the localization error. In the system analysis, first reflection from plaster walls (high reflectivity 0.8), thermal noise, and shot noise are considered. The simulation results show that almost all the room (99.4%) has error less than 0.6 m by using regression approach instead of (72.19%) by using the classical approaches. The maximum error decreases from 1.15 m to 0.73 m, the average error from 0.37 m to 0.22 m, and the standard deviation from 0.28 m to 0.15 m. Thus, maximum error is improved by (36.5%), average error by (41%), and standard deviation by (46%). A key conclusion of this work is that, using the regression method enhances the performance of VLC indoor positioning system.