World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:10, No:01, 2016

Hybrid Localization Schemes for Wireless Sensor Networks

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Abstract : This article provides range based improvements over a well-known single-hop range free localization scheme, Approximate Point in Triangulation (APIT) by proposing an energy efficient Barycentric coordinate based Point-In-Triangulation (PIT) test along with PIT based trilateration. These improvements result in energy efficiency, reduced localization error and improved localization coverage compared to APIT and its variants. Moreover, we propose to embed Received signal strength indication (RSSI) based distance estimation in DV-Hop which is a multi-hop localization scheme. The proposed localization algorithm achieves energy efficiency and reduced localization error compared to DV-Hop and its available improvements. Furthermore, a hybrid multi-hop localization scheme is also proposed that utilize Barycentric coordinate based PIT test and both range based (Received signal strength indicator) and range free (hop count) techniques for distance estimation. Our experimental results provide evidence that proposed hybrid multi-hop localization scheme results in two to five times reduction in the localization error compare to DV-Hop and its variants, at reduced energy requirements.

Keywords : Localization, Trilateration, Triangulation, Wireless Sensor Networks
Conference Title : ICCCISE 2016 : International Conference on Computer, Communication and Information Sciences, and Engineering
Conference Location : Jeddah, Saudi Arabia
Conference Dates : January 26-27, 2016