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| **Abstract:** |  |
| Received signal's time-of-arrival (TOA) based real time ranging system is widely used for UWB geolocation. However, multipath radio wave propagation and Non-line-of-sight (NLOS) incidents can cause a large error in source localization. In order to mitigate these errors, this paper proposes and investigates a novel approach which makes a hybrid combination of fingerprinting (FP) positioning and an iterative Time of Arrival (TOA) real time positioning method. Moreover, to reduce the computational complexities in FP method, we introduce a unique idea for the arrangement of reference tags to create fingerprinting database. Each arrangement of reference tags resembles a shape of polygon, which size dominates the computational complexities of FP as well as proposed hybrid method. By analyzing the tradeoff between positioning accuracies and computational complexities in proposed method we determine the appropriate size of polygon to reduce the computational complexity while maintaining a higher positioning accuracy. Moreover, proposed method is the effective solution of geo-location in the dense multipath condition and in the worst cases of NLOS. Finally, in comparison with TOA only, FP only and a conventional iterative positioning method the proposed hybrid method yields better performance and is much more robust in dense multipath situations. | |