

## Optimal Design of Reference Node Placement for Wireless Indoor Positioning Systems in Multi-Floor Building

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**Abstract :** In this paper, we propose an optimization technique that can be used to optimize the placements of reference nodes and improve the location determination performance for the multi-floor building. The proposed technique is based on Simulated Annealing algorithm (SA) and is called MSMR-M. The performance study in this work is based on simulation. We compare other node-placement techniques found in the literature with the optimal node-placement solutions obtained from our optimization. The results show that using the optimal node-placement obtained by our proposed technique can improve the positioning error distances up to 20% better than those of the other techniques. The proposed technique can provide an average error distance within 1.42 meters.

**Keywords :** indoor positioning system, optimization system design, multi-floor building, wireless sensor networks

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