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Optimized Localization of Target Nodes using Single Mobile Anchor Node in Wireless Sensor Network

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Abstract

In Wireless Sensor Networks (WSNs), main challenges which restrict the performance are data computation, lifetime, routing, task scheduling, security, organization and localization. Recently, numerous Computational Intelligence (CI) based potential solutions for above mentioned challenges have been proposed to fulfill the desired level of performance in WSNs. Use of CI gives autonomous and strong solutions to ascertain precise node location (2D/3D) with least hardware necessity (position finding device, i.e., GPS empowered gadget). Localization of target nodes in static scenario can be done more precisely. However, in case of mobility, determining accurate position of each node in network is a challenging problem. In this paper, a novel idea of localizing target nodes with moving single anchor node is proposed using CI based application of Particle Swarm Optimization (PSO) and H-Best Particle Swarm Optimization (HPSO). The moving anchor node is following the Hilbert trajectory. Proposed algorithms are actualized for range-based, distributed, non-collaborative and isotropic WSNs. Only single moving anchor node is used as a reference node to localize the target nodes in the entire network. In proposed algorithms, problem of Line of Sight (LoS) is minimized due to projection of virtual anchor nodes.

Key words: Wireless Sensor Networks (WSNs), Localization, Particle Swarm Optimization (PSO), H-Best Particle Swarm Optimization (HPSO), Hilbert space filling Curve.

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