

Heuristic Search Algorithm (HSA) for Enhancing the Lifetime of Wireless Sensor Networks

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Abstract : The lifetime of a wireless sensor network can be effectively increased by using scheduling operations. Once the sensors are randomly deployed, the task at hand is to find the largest number of disjoint sets of sensors such that every sensor set provides complete coverage of the target area. At any instant, only one of these disjoint sets is switched on, while all other are switched off. This paper proposes a heuristic search method to find the maximum number of disjoint sets that completely cover the region. A population of randomly initialized members is made to explore the solution space. A set of heuristics has been applied to guide the members to a possible solution in their neighborhood. The heuristics escalate the convergence of the algorithm. The best solution explored by the population is recorded and is continuously updated. The proposed algorithm has been tested for applications which require sensing of multiple target points, referred to as point coverage applications. Results show that the proposed algorithm outclasses the existing algorithms. It always finds the optimum solution, and that too by making fewer number of fitness function evaluations than the existing approaches.

Keywords : coverage, disjoint sets, heuristic, lifetime, scheduling, Wireless sensor networks, WSN

Conference Title : ICECECE 2015 : International Conference on Electrical, Computer, Electronics and Communication Engineering

Conference Location : London, United Kingdom

Conference Dates : August 20-21, 2015