

# OPTIMIZATION APPROACHES TO SENSOR PLACEMENT PROBLEMS

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## ABSTRACT

Recent technological advances have facilitated the widespread use of wireless sensor networks in many applications. Due to battery life concerns it is often of great importance that the network configurations in use minimize energy consumption while meeting some appropriate quality of service threshold. We develop a framework for solving sensor placement problems that separates the solution procedure from geometric or other concerns that may exist in specific problem instances. After an implementation-specific pre-processing stage, coverage problems are reduced to simple combinatorial optimization problems. Further, we develop two approaches for determining solutions for the coverage connectivity problem: the first a cutting-plane algorithm for single connectivity and the second a mixed integer semidefinite formulation of the problem which allows for the solution of the coverage of the coverage-connectivity problem for higher degrees of connectivity. Lastly, we do a brief investigation into the prospect of network lifetime maximization using the feasible solutions developed by these algorithms.