Highlights:

- A three-tier service-oriented framework for wireless sensor networks (WSN) is proposed, where sensor nodes are encapsulated and represented as WSN services, and these WSN services are categorized into a limited number of service classes according to their functionalities.
- Service classes chains discovery and recommendation is achieved where the functionalities provided by sensor nodes are considered.
- WSN services composition through determining appropriate WSN services for certain service classes in chains, where the factors including spatial- and temporal-constraints and energy-efficiency are considered. This is reduced to a multi-objective and multi-constrained optimization problem, and can be solved through genetic or particle swarm optimization algorithms.
- An overall evaluation has been conducted through experiments. The result shows that the particle swarm optimization algorithm outperforms the genetic algorithm in finding approximately optimal WSN services compositions.