**Title:** An RFID and Particle Filter-Based Indoor Spatial Query Evaluation System

**Abstract:** People spend a significant amount of time in indoor spaces (e.g., office buildings, subway systems, etc.) in their daily lives. Therefore, it is important to develop efficient indoor spatial query algorithms for supporting various location-based applications. However, indoor spaces differ from outdoor spaces because users have to follow the indoor floor plan for their movements. In addition, positioning in indoor environments is mainly based on sensing devices (e.g., RFID readers) rather than GPS devices. Consequently, we cannot apply existing spatial query evaluation techniques devised for outdoor environments for this new challenge. Because particle filters can be employed to estimate the state of a system that changes over time using a sequence of noisy measurements made on the system, in this research, we propose the particle filter-based location inference method as the basis for evaluating indoor spatial queries with noisy RFID raw data. Furthermore, two novel models, indoor walking graph model and anchor point indexing model, are created for tracking object locations in indoor environments. Based on the inference method and tracking models, we develop innovative indoor range and *k* nearest neighbor (*k*NN) query algorithms.

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