

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

Tracking Variable Number of Targets in Sensor Networks based on RSS measurement

Model

By

Jaechan Lim

The main studied problem in this dissertation is tracking unidentified targets by particle filtering (Particle filtering is now well known Bayesian filtering solution for non-linear or/and non Gaussian problems so that it may not require to emphasize its powerful features or practical usefulness anymore.) in wireless sensor network system where the number of targets is unknown and varies with time, the reference power of the target is unknown and varies with time. Traditionally, RSS (received signal strength) measurement is not popular as much as “bearing (angle)” or “range” because it is not appropriate to assume one to one mapping between a target and the measurement. Instead, RSS measurement-based target tracking is less expensive because the pre-processing of the data for the estimation of the parameters is simple in contrast to other measurement-based target tracking method. It is very challenging when tracking multiple and varying number targets via single measurement even though we take advantage of a number of sensors for us to be able to fuse the data. During the tracking procedure, we apply least squares (LS) method for quick and simple step, therefore less expensive, when we localize the initial location and reference power of the target. We modify, improve, and apply this initializing method to localization platform, specifically in the problems, such as locating wireless mobile phone in cellular communication system or localizing anchor sensor node in ad-hoc wireless sensor network system of which problems are quite active research topics currently. Basically, we solve the non linear LS method which results in the same as maximum likelihood (ML) method in Gaussian noise model, and our approach is applying iterative ML method to solve the non-linear LS method. Another detection algorithm for target tracking is introduced where we apply likelihood ratio test for decision making process. In accordance with the decision of detection step, we apply particle filter or maximum likelihood Monte Carlo method to complete the tracking system.

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