THESIS INFORMATION

Title: **PARTICLE FILTER-BASED METHODS FOR RESAMPLING PROBLEMS IN WIRELESS NETWORKS**

Major: **Telecommunication Technology**

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Contributions of this thesis

The purpose of this thesis is to study and develop resampling methods for Particle Filters (PF) to improve the quality of computation and localization error for non-linear problems as well as for wireless target tracking. The studies of the thesis are developed in depth with inheritance.

The authors have released a theory about PFs implemented on FPGA. Since then, firstly, the authors proposed and implemented a non-linear system based on both reality and simulation to benchmark their results. The Senquential Important Resampling (SIR) algorithm based on PF and Virtex-II Pro board supported Xilinx tool for MATLAB is to use the fundamental of the first implementation PF studies. The disadvantage of this study is to apply well only for PF with 50 samples.

To reduce the number of particles, the authors have proposed the finding error bound method for (Kullback-Leibler Distance) KLD-resampling based on PF, called the second study, to solve the wireless target tracking in case of different anchor nodes (5, 10, 15, 20 anchor nodes) and various power levels. In other words, the authors study this approach that effects various power levels or power-management plane. The available data set of LAURA is supported on website. Simulation results show that this method enhances the tracking error and the changing power levels in all case of various anchor nodes compared with traditional approaches.

To further reduce the number of particles, the authors have also proposed the finding lower bound variance for KLD-resampling adjusted variance and gradient data based on PF, namely the third study, to improve the target localization of LAURA system. Similar to the second study, all results show that this method enhances the error localization and the affecting power-management plane under various anchor nodes when compared previous methods.

Combining the finding error bound and lower bound variance method for KLD-resampling adjusted variance and gradient data is, the last study, to solve the tracking target based on received signal strength. Final, the error localization, the number of particle used, and the operation time are studied and evaluated for tracking robot.

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