An Indoor Localization System Considering Channel Interference and the Reliability of the RSSI Measurement to Enhance Location Accuracy

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Abstract—An indoor localization system in wireless sensor networks has become a hot development area. Received signal strength indicator (RSSI)-based localization is a promising technique since it requires a relatively low configuration, battery power and easy control. However, the received signal strength is influenced by channel interference and propagation environments. This characteristic affects channel stability and location accuracy in RSSI-based localization. As a result, we propose a novel indoor localization system consisting of a pre-processing method and a post-processing method. To improve channel stability, the pre-processing method selects an optimal channel in terms of the smallest distance error. The optimal channel is less affected to IEEE 802.11. To develop location accuracy, the post-processing method performs maximum likelihood estimation-based location tracking scheme considering the reliability of the RSSI value measurement. We apply three methods to the existing MLE to improve the reliability of the RSSI value. By using this indoor localization system with pre-processing and post-processing, the location error can be reduced. We also proved the performance of the indoor localization system by conducting experiments in a real indoor environment.

Keyword—IEEE 802.15.4, Localization, IEEE 802.11, RSSI, Location Error, Channel Interference

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