A Performance Evaluation of Modified Weighted Pathloss Scenario Based on the Cluster Based-PLE for an Indoor Positioning of Wireless Sensor Network

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Abstract

The indoor positioning system is one of the popular topics in the current study; it is mainly due to the inability of the Global Positioning System (GPS) applied inside a building. LANDMARC (Location Identification based on Dynamic Active RFID Calibration) and Enhanced LANDMARC Scenario use calibration RSSI values and weighted process to obtain accuracy of position estimation. Meanwhile, WPL (Weighted Pathloss) method improves the positioning accuracy of the two previous methods (LANDMARC and Enhanced LANDMARC) by observing the Path Loss Exponent (PLE) value in an indoor environment, followed by using the value to estimate the object position. We propose a Modified WPL uses Cluster Based Pathloss Exponent (PLE) method by combining the functions of the existing calibration in LANDMARC Scenario with the Cluster Based PLE value. The test bed was conducted in an indoor area on the 3rd floor of the PENS Postgraduate Building. The nodes were connected to each other using X-Bee Pro S2 module. RSSI (Received Signal Strength Indicator) value was used to estimate the distance between transmitter and receiver nodes. The result of the MSE estimation position using the proposed method was 3.80 meters, whereas WPL method was 5.78 meters. Overall, the proposed Modified WPL with Cluster Based PLE method showed that it had the capability to enhance the accuracy of localization; 34% better than the standard WPL method.

Keywords: indoor positioning system, LANDMARC, WPL, cluster based PLE

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