ABSTRACT

Ultra-Wide Band (UWB) is a wireless technology that utilizes frequencies with a wide bandwidth to provide coverage and positioning with centimeter-level accuracy. This technology has been widely applied in various fields, such as activity recognition, indoor localization, and through-wall radar. One of the main advantages of UWB is its ability to determine the location of objects with an accuracy of up to 10 cm, making it ideal for tracking moving assets in complex and space-sensitive environments. In this study, a UWB-based positioning system uses a minimum of three anchors and one tag to measure the distance between devices using the Two-Way Ranging (TWR) method. However, some conditions can reduce the measurement accuracy. To overcome this, this study proposes the use of the Support Vector Regression (SVR) algorithm to improve the accuracy of the system's positioning. SVR is a regression method that supports linear and non-linear regression, with the aim of finding the optimal hyperplane that minimizes prediction errors. The results of the study show that UWB combined with SVR can provide significant accuracy, with a Mean Absolute Error (MAE) of 17 cm on the X coordinate and 19 cm on the Y coordinate, and a Mean Squared Error (MSE) of 4 cm on the X coordinate and 5 cm on the Y coordinate in Line of Sight (LOS) conditions. This confirms that the combination of UWB and SVR is an effective approach in improving the accuracy of indoor positioning.

Keyword: Regression, Ultra-Wide Band, Machine Learning, Support Vector Regression, Indoor Positioning