The Positioning in Multi-dimensional Grid Using Passive RFID of RSSI Feature Analysis

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The current RFID positioning systems mostly use active tags, while passive tags have its own superiority concerning its low cost and free of maintenance. Besides, with a battery in every tag causes unnecessary wastes. Considering their different features of RSSI (Received Signal Strength Indication) distribution, the positioning algorithm of active tags is not feasible for passive tags. The purpose of this project is to develop an RFID-based positioning system using passive tags and design a new algorithm. A certain number of fixed passive RFID tags are preset in the multi-dimensional grid, which purposely divides the whole space into many smaller ones. Every group of fixed tags represents one certain space. The RFID reader reads the RSSI of target and fixed tags and then analysis the features of the RSSI distribution of every tag. Using machine learning, the system decides which ones of the fixed tags can be considered as the neighbor of the target tag. With the location of the fixed tags known, the place where most neighboring targets concentrate is considered as the position of the target tag. The results of the experiments show that the accuracy of this system can reach 1.6 feet and less. This system makes passive tags which are originally used for information storage have the positioning function. It can expand their application and function in the Internet of Things without the redeployment. The system can be applied in the libraries, mass gatherings and warehouse management.

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