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RFID Localization Using Angle of Arrival Cluster Forming

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Abstract: Radio Frequency Identification (RFID) has been increasingly used to identify and track objects automatically. RFID has also been used to localize tagged objects. Several RFID localization schemes have been proposed in the literature; some of these schemes estimate the distance between the tag and the reader using the Received Signal Strength Index (RSSI). From a theoretical point of view, RSSI is an excellent approach to estimate the distance between a sender and a receiver. However, our experiments show that there are many factors that influence the RSSI value substantially and that, in turn, has a negative effect on the accuracy of the estimated distance. Another approach that has been recently proposed is utilizing transmission power control from the reader side. Our experiments show that power control results are more stable and accurate than RSSI results. In this paper, we present a test-bed comparison between the power control and the RSSI distance estimation approaches for active RFID tags. We also present the Angle of arrival Cluster Forming (ACF) localization scheme that uses both the angle of arrival of the tag's signal and the reader's transmission power control to localize active tags. Our experiments show that ACF is very accurate in estimating the location of active RFID tags.