

# RFID Indoor Localization System for Tag and Tag-free Target based on Interference

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**Abstract**—This paper proposes a passive UHF RFID indoor localization system for both tag and tag-free target based on interference. We take number of tags as landmarks and interpolate virtual tags using nature-neighbour interpolation. We monitor the interference by measuring the phase difference of reference tags. Two situations are considered: on the ground and in free-space. When tag or tag-free target is deployed, it likes a stone thrown in the water. The difficulty is find the projection point of tag or tag-free target. We use peak area and trough area to get the nearest reference points on the ground situation and use least square method to get the projection point in free space situation. The prototype was simply built comprising COTS RFID reader, Class 1 Gen 2 UHF tags. Measurement was carried out in an indoor environment, and the experimental result shows that the mean error is less than 6cm on the ground, and less than 30cm in free-space.

**Keyword**—UHF RFID, Localization, Passive tag, Tag-free, Landmark, Interference.



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