

Research Topic: Accurate Objects Localization Using Multi-Subcarrier Backscatter Communication System

Name: Nitish Rajoria

Affiliation: Graduate School of Media and Governance

Research Outline:

The goal of this research is to recognize and localize the object's position precisely in indoor environment. I am using passive (batteryless) RFID tags and readers to design a user-friendly, reliable system focusing multi-Frequency ranging using multiple subcarrier generated by a single sensor-RF tag leveraging an accurate phase measurement algorithm using adaptive filter to estimate the object location accurately. Potential application of system includes real time tracking, managing, and locating objects. For example: locate books in library, arms in military camp, bags in airport, etc.

Research Outcomes:

To locate the object accurately, there is need to measure the phase difference precisely with different frequency. I proposed an idea to get the precisely accurate phase difference which indirectly means precise location of object. An idea of Multiple Subcarrier Multiple Access (MSMA) introduced, for collecting streaming data from multiple sensors simultaneously, where tag transmit on a subcarrier which produce the harmonics. Our idea is to use the primal subcarrier and harmonics for receiving the tag response at the same time for two different frequencies to measure the phase difference. A labview program developed to cancel out the unavoidable interference and a RF tag integrated with sensor is designed for collecting streaming data.

The results from the experiment and simulation are submitted in the IOT-2016 conference and WiSPNET-17 conference.

1. Doctoral Colloquium (DC) paper

A DC paper accepted in the IoT-2016. The conference held at Germany, results are presented and discussed with their peers and senior faculty from the Doctoral Colloquium Committee of the IoT 2016.

2. Conference Paper

The results has been accepted for "Oral presentation" at the 2017 IEEE International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET 2017).