

The Use of Antenna Radiation Pattern in Node Localisation Algorithms for Wireless Sensor Networks

Martin K. Mwila
F'SATIE/TUT, Pretoria, South Africa
Tshwane University of Technology
CSIR, Pretoria, South Africa
Email: mmwila@csir.co.za

Karim Djouani
F'SATIE/TUT, Pretoria, South Africa
Tshwane University of Technology
University Paris 12, Creteil, France
Email: djouani@univ-paris12.fr

Anish Kurien
F'SATIE/TUT, Pretoria, South Africa
Tshwane University of Technology
Pretoria, South Africa
Email: Kurienam@tut.ac.za

Abstract

Localisation or position determination is one of the most important applications for wireless sensor networks since the locations of the sensor nodes are critical to both network operations and most application level tasks. Numerous techniques for localisation of sensor nodes have been proposed that make use the Received Signal Strength Indicator (RSSI) from sensor nodes due to its simplicity and cost. Most of the research thus far has regarded the RSSI technology as unsuitable for accurate localisation due to the limited accuracy inherent to the current ranging model. These models, however, make the assumption that the antenna radiation pattern is omnidirectional targeted to simplifying the complexity of the algorithms. An increasing number of sensor systems are now deploying directional antennas due to their advantages like energy conservation and better bandwidth utilisation. The study presented by this paper reviews some related works that include the antenna radiation pattern of the sensor node during the localisation process and proposes an efficient approach to increasing localisation accuracy using antenna radiation pattern.