

Research on positioning techniques using RFID - Radio Frequency Identification

Hoang Tuan Vu

Abstract: This study investigates localization techniques utilizing Radio Frequency Identification (RFID) technology. RFID-based positioning has gained significant attention due to its low cost, non-line-of-sight operation, and applicability in indoor environments where Global Positioning Systems (GPS) are ineffective. The research systematically analyzes and compares major RFID localization approaches, including received signal strength indication (RSSI), time of arrival (TOA), time difference of arrival (TDOA), angle of arrival (AOA), and phase-based methods. A comprehensive evaluation of these techniques is conducted, focusing on accuracy, computational complexity, scalability, and environmental robustness. Furthermore, the study explores hybrid approaches that combine multiple metrics to enhance positioning precision. Experimental results demonstrate that while RSSI methods offer simplicity, they suffer from multipath interference; conversely, phase-based techniques provide higher accuracy at the cost of increased hardware requirements. The findings contribute to the development of efficient RFID-based positioning systems for applications in logistics, healthcare, and smart environments, offering practical guidelines for selecting appropriate techniques based on specific operational constraints.

Keywords: RFID, positioning, positioning techniques, radio frequency identification