

Accurate Positioning Based on a Combination of Power Control and Signal Strength Indicator Using Active RFID System

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ABSTRACT

The aim of this paper is to produce a new positioning technique to assist blind and people with low vision to indicate their locations. The presented technique is based on a combination of power level and Signal Strength Indicator (SSI) using active Radio Frequency Identification RFID technology. The system uses a mobile reader with feature of power control which has been calibrated to estimate distances between the user (reader) and active tags with known locations. Then SSI is used as a distance estimator for short range and in combination with the power level of transmitter for a wider range up to 70 meters. Global Positioning System (GPS) works efficiently in a similar environment but the accuracy of GPS is around ten to twenty meters and it does not work efficiently at indoor environments. Through this research we study the orientation impact of the reader and tag as one of the factors which affects results. In addition, we took into account the different sensitivity of tags to establish a more reliable system. The reader has eight power levels, and the geographic range of each level using various tags has been calculated. Then for evaluation purpose 108 experiments were conducted using three tags with distances from 1 meter to 30 meters using power setting 1 to 6. A successful detection rate of 93.5% was achieved, as well as a false positive rate of 1%.

KEYWORDS: Positioning, Active RFID, Power control, SSI and visually impaired.