

Design and Implementation of a RFID Based Real-Time Location-aware System in Clean Room

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Abstract

The application of Automated Material Handling System (AMHS) to the semiconductor manufacturing factories is one of the most important steps in the automation process of semiconductor business. All cassettes in the vehicle of the transportation equipment will be able to send their positioning information through this system. Nevertheless, some positioning information will be interfered or get lost if there is any relocation of the cassettes from the effective ranges of AMHS by operators. In order to these lost cassettes only manpower is possible, and the searching process is wasting time and inefficient. In this paper, we implement a Clean Room Real-Time Location-aware System (CRRLS) based on the technology of RFID (Radio Frequency Identification) in accordance with the special character of equipments arrangement of clean rooms in the semiconductor manufacturing factories. The proposed system can reveal the positioning information of the cassette in the clean room by analyzing the received radio frequency energy information. Moreover, we establish a transmitting model of radio signal, and used this model to estimate distance between tag and RFID readers. A triangular positioning system is developed to define the location and its 2-dimensional absolute coordinate of the item. As a result, the lost item can be retrieved easily. Furthermore, the reusability of RFID tags can store additional information sent by the transceiver and parameters on the production process to reduce the possibility of severe damage because of wrong parameters setting, the competence of semiconductor business can herewith greatly increase.

Keyword : Automated material handling system, RFID, Real-Time Location-aware System, Radio signal frequency energy, Triangular positioning system