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算法研究

基于电子标签智能化的二进制树型搜索防冲突算法

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摘要：

随着由物联网引领的第三次全球信息产业浪潮的不断推进，作为本世纪最具核心竞争力的物联网关键技术——RFID（射频识别）技术，已成为制造全球化、贸易全球化和物流全球化的核心推动力。目前，RFID技术已经普及到生产和生活的各个领域，而随之带来的却是系统核心技术研发的瓶颈。针对RFID系统的交互性能，提高系统防冲突能力，减少总识别时间已成为当前急需解决的关键。对此，本文提出了一种基于电子标签智能化的二进制树型搜索算法(TBTS)。该算法是在当前应用广泛的ISO/IEC 14443协议的基础上，针对协议TYPE A所描述的动态二进制树型搜索算法(DBTS)进行改进。文中根据对两种算法在共50个电子标签的典型系统中进行仿真的结果进行比较表明，TBTS算法对所有电子标签进行识别的时间要比DBTS算法缩短近50%，且随着电子标签的数量的增加，TBTS算法将使系统表现出更优越的交互性能，成功实现算法复杂度的降阶。目前，TBTS算法已在智能卡仿真平台中进行了仿真验证，已被成功应用到我们自主设计的新一代RFID智能卡芯片中，经测试，其效果比普通标签卡得到了较大的改善。

关键词： 防冲突;RFID;树型搜索;识别速度

A Tag-intelligentization-based Binary Tree Search Anti-collision Algorithm for RFID Tag

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Abstract:

As the new wave of global information industry revolution led by Internet of things (IOT) is continuously urged, RFID (radio frequency identification) technology which is one of the key technologies with core competence of IOT, has become the core driving force to achieve globalization of manufacture, trade and logistics. At home, the technology of RFID tag chips is facing great challenges, such as the shortage in application development and independent intellectual property. Nowaday, RFID technology has been made universal in every areas around our daily lives and the productions. Meanwhile, a bottleneck restriction in the research of core technology has also come out. Contraposing the R & D problems emerging at the innovation of RFID tag chips technology, to improve the ability during anti-collisions, and to reduce the total time of identification has become the key point for the solution. In this paper, we present a Tag-intelligentization-based Binary Tree Search anti-collision algorithm, which TBTS is short for. It is an optimized algorithm based upon a Dynamic Binary Tree Search anti-collision algorithm, which DBTS is short for. Our performance evaluation shows that TBTS surpasses other existing DBTS algorithms. According to our simulation results, the total identification time of the Tag-intelligentization-based Binary Tree Search anti-collision algorithm is reduced by nearly 50% for 50 tags compared to the Dynamic Binary Tree Search anti-collision algorithm. Moreover, with the increasing number of tags, the Tag-intelligentization-based Binary Tree Search anti-collision algorithm has higher performance and less identifying time than the Dynamic Binary Tree Search anti-collision algorithm. It has been applied to RFID transponder chip designed by ourselves and successfully run on the simulation platform of smart card chip. The final test report shows that, the smart card chip which uses the Tag-intelligentization-based Binary Tree Search anti-collision algorithm makes a more wondeful performance than the simple tag chip using the Dynamic Binary Tree Search anti-collision algorithm.

Keywords: Anti-collision RFID Binary Tree;Identifying Speed

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