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软件过程技术

嵌入式实时操作系统任务调度算法的改进与应用

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摘要： 在嵌入式系统中，任务调度器的好坏很大程度上决定了系统的性能。针对经典的速率单调(RM)调度算法以任务的周期作为优先级的评测标准，容易导致某些周期长且重要的任务错过截止期限，而当任务数量趋于无穷时，CPU的利用率仅为69%的特点，提出一种新的静态调度算法—NSRL。该算法在任务控制块(TCB)中增加两个域，分别为任务的重要度和裕度为零的时刻。在高优先级任务优先执行的前提下，重要度较高且未执行的任务当且仅当裕度为零时，具有较高的优先权可以抢占当前任务运行。通过理论分析和具体实验，该方法降低了任务截止期错失率，提高了CPU利用率，可以更有效地调度实时任务，在无线宽带移动计算中得到了较好应用。

关键词： 嵌入式实时操作系统 速率单调 周期任务 实时调度 无线宽带移动计算 embedded real-time operating system Rate-Monotonic (RM) periodic task real-time scheduling wireless broadband and mobile computing

Improved task scheduling algorithm for embedded real-time operating system and its application

Abstract: It is the scheduler that decides the capability of the embedded system. For the Rate-Monotonic (RM) scheduling algorithm determines priority only by the period, the deadline of long period and important tasks can not be guaranteed and the system resources can not be effectively utilized. When the number of the task is infinite, the utilization rate of CPU is only 69%. Here, a new static priority scheduling algorithm called NSRL (new scheduling algorithm based on rate and laxity) was proposed. Two parameters were added to the Task Control Block (TCB): one was the importance of the task, and the other was the laxity. The one whose importance was higher only when its laxity was zero could preempt the running task. The experimental results show that the algorithm can decrease the deadline-missing ratio of the tasks and the CPU resource can be used more effectively. It is an efficient way of scheduling the real-time tasks; also it is useful for the application in wireless broadband and mobile computing.

Keywords:

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