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An Analysis of a Hard Real-Time Execution Environment Extension for FreeRTOS

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Abstract

FreeRTOS is a popular real-time operating system, which has been under a significant attention in the last years due to its main advantages: it is open source, portable, well documented and implemented on more than 30 architectures. FreeRTOS execution environment is dynamic, preemptive and priority based, but it is not suitable for hard real-time tasks, because it provides task execution determinism only to a certain degree and cannot guarantee the absence of task execution jitter. As a solution to this problem, we propose a hard real time execution extension to FreeRTOS in order to support a particular model of HRT tasks, called ModXs, which are executed with no jitter. This article presents a detailed analysis, in terms of scheduling, task execution and memory usage of this hard real time execution environment extension. The article is concluding with the advantages this extension brings to the system compared to the small memory and timing overhead introduced.



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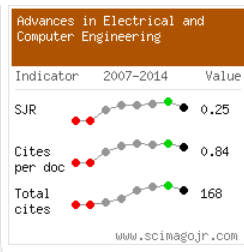
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