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Title: Novel Hybrid Scheduling Technique for Sensor Nodes with Mixed Criticality Tasks

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Abstract: Sensor networks become increasingly a key technology for complex control applications. Their potential use in safety- and time-critical domains has raised the need for task scheduling mechanisms specially adapted to sensor node specific requirements, often materialized in predictable jitter-less execution of tasks characterized by different criticality levels. This paper offers an efficient scheduling solution, named Hybrid Hard Real-Time Scheduling ((HRTS)-R-2), which combines a static, clock driven method with a dynamic, event driven scheduling technique, in order to provide high execution predictability, while keeping a high node Central Processing Unit (CPU) utilization factor. From the detailed, integrated schedulability analysis of the (HRTS)-R-2, a set of sufficiency tests are introduced and demonstrated based on the processor demand and linear upper bound metrics. The performance and correct behavior of the proposed hybrid scheduling technique have been extensively evaluated and validated both on a simulator and on a sensor mote equipped with ARM7 microcontroller.

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