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Energy-Efficient Environmental Monitoring System

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With the rapid evolution of embedded technologies,
systems have become increasingly compact and efficient, especially in terms of energy consumption. This enables the development of distributed monitoring solutions where devices are no longer powered by batteries, but by other components capable of storing energy, such as supercapacitors. However, to operate at maximum efficiency, the system must also be optimized from a software perspective, as executing fewer instructions or setting different operating modes for sensors can significantly impact the system's lifespan.
This paper aims to present the hardware components, software optimizations, adaptation algorithms for environmental conditions and current system status, as well as the results of the experiments conducted. TinySense is a monitoring system based on an ARM Cortex M4 microcontroller, which uses a supercapacitor as an energy storage element. The supercapacitor is recharged via a solar panel
that converts light energy into electrical energy.

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