Gas sensors measurements during the initial action period of duty-cycling for power savings (2017)

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One of the main problems of working with metal oxide semiconductor gas sensors in wireless sensor networks is power consumption. Duty-cycling, i.e., switching off the power of the gas sensor and minimizing the node's active time is a well-known power saving technique. But the initial action period of the gas sensor after it is switched back on imposes a lower limit on the active time, and therefore a limit on the power savings. The length of a sensor's initial action period depends on atmospheric conditions, but values of several tens of seconds or even minutes are common. In this paper a correction technique is presented which enables measurements taken during the sensor's initial action period to be used, thus allowing the node's active time to be reduced to less than that period. To check the validity of the proposed correction, the responses of two sensors are compared, one continuously powered and the other switched on and off. When the correction is applied to the switched sensor's response, there appears a trade-off between sensor precision and power consumption. The measurements taken with the two sensors after 5 s of power-on time are strongly correlated (r^2 = 0.95).

Keywords:Â Wireless sensor network, initial action, gas sensor, power saving