

## Accepted Manuscript

Title: Optimization of Power Consumption for Gas Sensor Nodes: A Survey

Author: Alexander Baranov Denis Spirjakin Saba Akbari  
Andrey Somov



PII: S0924-4247(15)30070-4  
DOI: <http://dx.doi.org/doi:10.1016/j.sna.2015.07.016>  
Reference: SNA 9248

To appear in: *Sensors and Actuators A*

Received date: 30-4-2015  
Revised date: 6-7-2015  
Accepted date: 15-7-2015

Please cite this article as: Alexander Baranov, Denis Spirjakin, Saba Akbari, Andrey Somov, Optimization of Power Consumption for Gas Sensor Nodes: A Survey, *Sensors and Actuators: A Physical* <http://dx.doi.org/10.1016/j.sna.2015.07.016>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Optimization of Power Consumption for Gas Sensor Nodes: A Survey

Alexander Baranov <sup>a</sup>, Denis Spirjakin <sup>a</sup>, Saba Akbari <sup>a,\*</sup>, Andrey Somov <sup>b</sup>

<sup>a</sup>MATI – Russian State Technological University, 121552 Moscow, Russia,

<sup>b</sup>CREATE-NET, 38123 Trento, Italy

**Abstract**—The Wireless Sensor Network (WSN) technology has recently been used, rather successfully, in a huge number of monitoring applications. However, the monitoring of combustible gases with WSN stands out from typical applications where the wireless communications function is much more power hungry than the sensing one. The reason behind this “dissonance” is in using catalytic or semiconductor sensors that ensure a trade-off among the safety requirements, performance and power consumption. This work provides a survey of intrinsic power optimization techniques with a special focus on recent advances in power management, sensor fabrication, sensing circuits, and measurement procedures. The paper concludes with providing a future outlook in the area.

Keywords: Gas sensors, power management, sensor node, wireless sensor network

### Highlights

This article has surveyed the latest achievements in the design of low power wireless gas sensor nodes for combustible gas detection and with an emphasis on semiconductor and catalytic sensors in order to analyze the possibility of developing fully energy autonomous nodes.

It is shown that joint efforts in improving the technology of industrial sensors, analog and digital circuit design and the measurement methods have been a significant progress to reduce the energy consumption in recent years that results in increasing the sensor node lifetime without the need for battery replacement. The perspectives, challenges and limitations of energy harvesting techniques are discussed with respect to the balance between the node energy consumption and the available power from alternative energy sources.

Download English Version:

<https://daneshyari.com/en/article/7135579>

Download Persian Version:

<https://daneshyari.com/article/7135579>

[Daneshyari.com](https://daneshyari.com)