Low-Power and Low-Cost Environmental IoT Electronic Nose Using Initial Action Period Measu... (2019)

TÃ-tulo:Low-Power and Low-Cost Environmental IoT Electronic Nose Using Initial Action Period Measurements
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Revista:Sensors
Vol./Pag.:2019, 19(4), 3183Ed./AÃ±o:Â MDPI, 2019DOI:10.3390/s19143183
ISSN:Â 1424-8220Abstract:

In this work, we present a complete hardware development and current consumption study of a portable electronic nose designed for the Internet-of-Things (IoT). Thanks to the technique of measuring in the initial action period, it can be reliably powered with a moderate-sized battery. The system is built around the well-known SoC (System on Chip) ESP8266EX, using low-cost electronics and standard sensors from Figaroâ€™s TGS26xx series. This SoC, in addition to a powerful microcontroller, provides Wi-Fi connectivity, making it very suitable for IoT applications. The system also includes a precision analog-to-digital converter for the measurements and a charging module for the lithium battery. During its operation, the designed software takes measurements periodically, and keeps the microcontroller in deep-sleep state most of the time, storing several measurements before uploading them to the cloud. In the experiments and tests carried out, we have focused our work on the measurement and optimization of current consumption, with the aim of extending the battery life. The results show that taking measurements every 4 min and uploading data every five measurements, the battery of 750 mAh needs to be charged approximately once a month. Despite the fact that we have used a specific model of gas sensor, this methodology is quite generic and could be extended to other sensors with lower consumption, increasing very significantly the duration of the battery.

Keywords: gas sensors, IoT, ESP8266, low power, low cost, initial action period