

INTISARI

PENGEMBANGAN SISTEM AKUISISI DATA SENSOR GAS BERBASIS FLUCTUATION-ENHANCED SENSING

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Sistem akuisisi data (DAQ) berbasis metode Fluctuation-Enhanced Sensing (FES) telah berhasil dikembangkan untuk mengakuisisi respon sensor gas. Bagian utama DAQ terdiri dari sebuah sensor gas (TGS 2602), sebuah rangkaian eksitasi sensor (pembangkit arus), sebuah mikrokontroler ATmega 328 (resolusi 10-bit), sebuah rangkaian pasif high-pass filter (R-C), penguat berbasis op-amp (CA3130), dan in-board soundcard (resolusi 16-Bit dan sampling rate 46 KHz). Rangkaian eksitasi digunakan untuk mengubah nilai resistansi dari TGS 2602 menjadi sinyal tegangan dengan bentuk DC. Mikrokontroler digunakan untuk mengkonversi nilai sinyal tegangan dari sensor dari analog ke digital. Komponen sinyal fluktuasi didapatkan dengan melewatkan sinyal tegangan ke pasif high-pass filter ($R = 1 \text{ k}\Omega$ dan $C = 110 \text{ }\mu\text{F}$). Sinyal fluktuasi sensor gas tersebut kemudian dikuatkan sebesar 10 kali dengan menggunakan amplifier dan direkam menggunakan soundcard. DAQ ini dapat memperlihatkan fingerprint berupa perbedaan antara udara, gas aseton dan gas etanol. Untuk mengendalikan proses pengambilan dan penyimpanan data, DAQ dilengkapi dengan sebuah Graphic User Interface (GUI). Hasil pengujian terhadap gas aseton dan etanol DAQ memperlihatkan bahwa sistem ini telah dapat merekam fluktuasi dari sensor TGS 2602 terhadap kedua gas tersebut pada saat konsentrasinya 12, 25, 37 dan 49 mg/m³.

Kata kunci : sistem akuisisi data, sensor gas, fluctuation-enhanced sensing

ABSTRACT

DEVELOPMENT OF DATA ACQUISITION SYSTEM BASED ON FLUCTUATION-ENHANCED SENSING FOR GAS SENSOR

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Data acquisition system (DAQ) based on fluctuation enhanced sensing (FES) method has been successfully developed to acquire gas sensor response. The main part of the DAQ consisted of a gas sensor (TGS 2602), a series of excitation sensor (current generator), a microcontroller ATmega 328 (10-bit resolution), a series of passive high-pass filter (RC), an amplifier of op-amp (CA3130), and in-board soundcards (16-Bit resolution and sampling rate of 46 KHz). The excitation circuit was used to change the resistance of TGS 2602 gas sensor into a DC voltage signal. The microcontroller was used to convert the value of the sensor voltage signal from analog to digital. The fluctuation component signal was obtained by passing a voltage signal to a passive high-pass filter ($R = 1\text{ k}\Omega$ and $C = 110\text{ }\mu\text{F}$). In this study, the fluctuations of the gas sensor signal was then amplified by 10 times using amplifiers and recorded using the soundcard. As a results, the DAQ shows the fingerprint of a gas, so that it was able differentiate between the air, acetone gas and ethanol gas. To control the retrieval and storage of data, the DAQ was equipped with a Graphic User Interface (GUI). The test results of acetone and ethanol gas DAQ shows that this system has been able to record the fluctuations of the TGS 2602 gas sensor against both the gaseous with concentration of 12, 25, 37 and 49 mg/m³.

Keyword : *Data acquisition system, gas sensor, fluctuation-enhanced sensing, soundcard*