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# Reducing the recognition time for a temperature-modulated commercial gas sensor

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In this project, a commercial gas sensor based on tin oxide, made in FIS company- SP3S-AQ2 model, was utilized for recognition of some volatile organic compounds. The sensor was temperature modulated by staircase waveform. To apply this waveform to sensor's heater, six staircase waveforms containing 5 step and with pulse duration equal to 1, 2, 3, 5, 10 and 20s were used. Sensor response was recorded by application staircase with aforesaid pulse duration for detection of 4 target gas: methanol, ethanol, 1-propanol and 1-butanol each at 11 concentration level. For analysis, each response was divided to five segment, corresponding to five step existing in waveforms and, then, each response segment along with its corresponding waveform were considered as five system. In these systems, heater waveforms and recorded sensor response were considered as system input and system output, respectively. To model these systems, we used ARMAX model which is a linear system identification model. In best case, ARMAX model for fitting the system output had the order of 1 or 2, which Fitness comment was used for best order ion. Model parameters were used as features of examined target gases. Extracted features each step together was considered as total feature vector. Then, these vectors moved to lower dimensions using Linear Discriminant Analysis (LDA) technique and realized that under all conditions the separation of four target gas was successfully accomplished. In addition, all results validated with test data. The results indicated successful data separation at all time.

**Keywords :** Discriminant Analysis

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