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Development of a Combustible Gas Detector with Two Sensor Modules to Enable Measuring Range of Low Concentration

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Abstract : In the gas industrial fields, there are many problems to detect extremely small amounts of combustible gas (CH_4) if a conventional semiconductor is used. Those reasons are that measuring is difficult at the low concentration level, the stabilization time is long, and an initial response time is slow. In this study, we propose a method to solve these issues using two specific sensors to overcome the circumstances of temperature and humidity. This idea is to combine a catalytic and a semiconductor type sensor and to utilize every advantage from every sensor's characteristic. In order to achieve the goal, we reduced fluctuations of a gas sensor for temperature and humidity by applying designed circuits for sensing temperature and humidity. And we induced the best calibration line of gas sensors through adjusting a weight value corresponding to changeable patterns of temperature and humidity after their data are previously acquired and stored. We proposed and developed the gas leak detector using two sensor modules, which is first operated by a semiconductor sensor for measuring small gas quantities and second a catalytic type sensor is detected if measuring range of the first sensor is beyond. We conclusively verified characteristics of sharp sensitivity and fast response time against even at lower gas concentration level through experiments other than a conventional gas sensor. We think that our proposed idea is very useful if another gas leak is developed to enable measuring extremely small quantities of toxic and flammable gases.

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