Microcontroller based Power Efficient Signal Conditioning Unit for Detection of a Single Gas using MEMS based Sensor

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Abstract-A low power MEMS based sensor along with the embedded power efficient signal conditioning unit (Microcontroller based), which can be used with any suitable sensor-network to detect and quantify variations in a particular gas concentration, has been reported in this paper. The power consumption of the MEMS gas sensor is ~ 70mW to 100mW depending upon its operating temperature (150-250°C) and that of entire signal conditioning unit (consisting of low noise amplifier, switch, microcontroller and power management chip) is ~ 36mW in the ON state and only ~7.2µW in OFF state (sleep mode). The test gas in this particular case was methane for which sensor resistance varied from 100KΩ to 10KΩ. This hybrid sensor system is very much suitable for detecting a single gas with display of corresponding gas concentrations and subsequent alarming if the threshold limit is crossed.

Index terms: MEMS, Gas sensor, Low power, Microcontroller, Signal Conditioning