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**Development and Performance Optimization of Constant Temperature Controller for Cross-Sensitivity Analysis of Combustible Gas Sensor.**

***ABSTRACT - Masterthesis***

Combustible gas sensors are thermal devices which are used to measure the combustible gas in the air. When a certain amount of combustible gases exist in the air, it oxidized with the help of a catalyst. The reaction is exothermic, heat is liberated due to the reaction and temperature of the sensor increases. This temperature increment causes deactivation of catalytic layer, that eventually damages the sensitivity of the sensor. On the other hand, gas sensor has to be selective to one specific gas. Cross-sensitivity analysis of the sensor is important for proper characterization of the sensor. Sinusoidal temperature modulation by microcontroller based digital control facilitates to analyze cross-sensitivity of the sensor. Therefore, it is necessary to develop a model for control of sensor temperature and cross-sensitivity analysis.

The main objective of this thesis is to develop an optimized temperature controller system that is capable of cross-sensitivity analysis of a gas sensor. The work includes the preparation of an experimental model to control the temperature and to obtain a sinusoidal temperature modulation of the catalytic combustible gas sensor. The sinusoidal temperature modulation is for studying the characteristics of the gas sensor. This model will be used for verifying the cross-sensitivity of the sensor. The system has to be optimized regarding the cross-sensitivity check by varying the parameters of the modulation. The analysis of the cross-sensitivity will be done by comparing time domain signals. Once the time domain analysis is achieved, the signal will be transferred into the frequency domain by Fourier transformation and the signal in the frequency domain will be analyzed. For the overall optimization of the system, the appropriate electronic control has to be modified to achieve the desired output. Finally, a comparative analysis between digital and analogue system of temperature control has to be done.