

Development of an embedded control system for compact diode laser gas sensors
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Evaluation of semiconductor systems suggests that great advances in compactness for gas sensors is possible. Our current system uses a combination of printed circuit boards, data acquisition peripherals and a notebook computer to monitor trace gas concentrations. Boards and computers are bulky and consume more power than integrated systems. The challenge is to embed a processor that can run the diode lasers as well as collect and process data to determine a concentration of a gas. Current DSP (digital signal processor) and MCU (microcontroller) technology permit complex control and signal processing functions to be integrated into an existing sensor, reducing total power consumption and improving reliability. Faster processors can return an added benefit of faster computation with matrices and fitting functions. We will discuss the fundamental differences between the two technologies and address control and DAQ problems for which each technology is suited.